University of the State of New York

High School Department

Bulletin 13 May 1901

NEW YORK STATE SCIENCE TEACHERS ASSOCIATION

PROCEEDINGS OF THE

FIFTH ANNUAL CONFERENCE

Held at Rochester university, Rochester, 28–29 December 1900

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PROCEEDINGS OF THE FIFTH ANNUAL CONFERENCE

Held at University of Rochester, Rochester, 28-29 December 1900

SUMMARY OF SESSIONS

Friday, 28 December, 9.30 a. m.

Meeting of executive council

Registration

Opening session; called to order by Prof. LEROY C. COOLEY, *chairman*

Address of welcome

Pres. RUSH RHEES, University of Rochester

Response

Prof. LEROY C. COOLEY, Vassar college, retiring president of the association

Introduction by Prof. LEROY C. COOLEY of Pres.-elect CHARLES W. DODGE, University of Rochester

Remarks

Prof. CHARLES W. DODGE

Section B—Biology. Prof. JAMES H. STOLLER, Union university, *chairman*

Framing a course in biology for untrained minds

Prof. HENRY R. LINVILLE, DeWitt Clinton high school, New York

Discussion

Prof. W. J. BEAL, Michigan agricultural college

Prof. C. G. ROGERS, Syracuse university

Prof. H. R. LINVILLE, DeWitt Clinton high school, New York

Inspector A. G. CLEMENT, Regents office, Albany

Zoology in secondary education

Prof. JACOB E. REIGHARD, University of Michigan

Discussion

Dr F. W. BARROWS, Buffalo central high school

Inspector A. G. CLEMENT, Regents office, Albany

Prof. HENRY R. LINVILLE, DeWitt Clinton high school, New York

Section C—Earth science. Prof. RICHARD E. DODGE, Teachers college, *chairman*

Theses on geography

Prof. F. M. MCMURRY, Teachers college

Discussion

Inspector C. F. WHEELOCK, Regents office, Albany

Sup't JAY CRISSEY, Penn Yan

Prin. FRANK CARNEY, Keuka institute

Prof. GRANT KARR, Oswego normal school

R. H. WHITBECK, Cornell university

Personal equipment of teachers of geology and geography

Prof. ALBERT P. BRIGHAM, Colgate university

Purposes of geography

Prof. AMOS W. FARNHAM, Oswego normal school

Section D—Nature study. Prin. CHANNING E. BEACH, Buffalo, *chairman*

Birds in nature study

Prof. E. H. EATON, Bradstreet's preparatory school for boys, Rochester

Nature study and the grade teacher
Mrs A. B. Comstock, Cornell university
Nature study in practice
Prin. E. J. Cobb, Buffalo school no. 60
Discussion
Mrs A. B. Comstock, Cornell university
Prof. John W. Spencer, Cornell university

General session

Moral value of science studies
Prin. Frank Carney, Keuka institute
Work of the junior naturalists clubs
Prof. John W. Spencer, Cornell university
Adjourned

SUMMARY OF ACTION

Committee reports

Alcohol and narcotics. The committee on alcohol and narcotics reported progress and asked for an extension of time.
Granted

Resolutions. The following resolutions were reported, and adopted.

Resolved, That we extend our hearty thanks to our visitors from other states who have responded so generously and acceptably to our president's invitation, by presenting papers and addresses, and by contributing in many ways to the success of this meeting.

Resolved, That we extend to the faculty and trustees of the University of Rochester our hearty thanks for their hospitality in providing us a place of meeting and in extending to us all those courtesies and attentions which have made us actually at home with them.

Nominations. The committee reported the following.
President, Franklin W. Barrows, Buffalo central high school
Vice-president, Frank M. McMurry, Columbia university
Secretary and treasurer, A. R. Warner, Auburn high school

Executive council, James H. Stoller, Union university; Thomas B. Lovell, Niagara Falls high school; William C. Peckham, Adelphi college, Brooklyn

On motion, the secretary cast the ballot of the association, and the nominees were declared elected.

Treasurer's report

For the year ending 29 Dec. 1900

Receipts

Balance in treasury	$138 29	
Annual dues	139 ..	
Interest	1 89	
		$279 18

Disbursements

Collections on checks	$ 80	
Printing	31 95	
Postage and expressage	26 25	
Clerical work	12 60	
Telegram	47	
Trunk line association	11 ..	
		83 07
Balance on hand, 29 Dec. 1900		$196 11

Adopted

Report of auditing committee

The auditing committee has examined the treasurer's report submitted today by Mr Kenyon, and find it correct in every particular.

FRANKLIN W. BARROWS *chairman*
JAMES H. STOLLER

Motions

Exercises in earth science. The chairman of section C, earth science, presented the following motion, on behalf of the section.

Moved, That the earth science section of the New York state science teachers association request the president to appoint a committee of seven to consider the preparation of a series of exer-

cises and suggest a course of study for public and high school laboratory and field work, and report at our next annual meeting.

The motion was carried, the committee to be announced later.

Apparatus. The following resolution, offered by the chairman of section A, physics and chemistry, was adopted.

Resolved, That a chairman be appointed on a committee of exhibit to see to it that an exhibit of apparatus is presented at the meeting of the association next year.

Meeting of 1901. The president announced that the next meeting of the association will be held at Syracuse, the date to be announced later.

ADDRESSES, PAPERS AND DISCUSSIONS

Friday morning, 28 December

Pres. L. C. Cooley—It is my privilege to call to order the New York state science teachers association at this first session of its fifth annual conference, and at the same time to announce the pleasant fact that we may at once listen to the president of this university that has so kindly opened its doors for our meetings. I have the honor to present Pres. Rush Rhees of the University of Rochester.

Pres. Rush Rhees—It is a very great pleasure, Mr President and ladies and gentlemen, to offer to you a welcome in behalf of the college which I represent and in whose halls you are meeting, and also in behalf of the city in which we dwell. I feel perfectly at liberty to offer you the freedom of the college and ask you to make use of it in the fullest sense. I also feel free to offer to you the freedom of the city, partly because in my short stay here I have experienced the hospitality that the city gives, and partly because I know the cordiality with which our people welcome your coming. We have been empowered to offer you the privilege of inspecting some of the most interesting industrial

works in the country, which will be opened to you as already announced. In these ways, therefore, the city offers its full freedom and its hospitality.

I can not resist the temptation, standing before you in this way, to express the interest I feel as a teacher of literature in your presence and your work. It is far from my purpose to undertake in any way a discussion of the results of your deliberations; you know them far better than I. I would simply quote a story I have heard, of a little boy who was given the task of writing a composition on the modern method of telling what he knew and what interested him. The subject assigned was man. I suppose the modern teacher of literature would not give so unrestricted a subject; but the boy used his brains and his eyes as well as his own method of expression, and the result was: "Man is a long thing, not very broad, split through the middle, and walks on the split end." This composition showed the result of individual observation; and, as a teacher of literature, I feel interested in your work because you are teaching boys and girls to see things and tell what they have seen. Probably there is nothing more promising from an educational point of view than this discipline in the use of the senses and a simple candid expression of the result of that use. Your presence here will be a stimulus to our work. It will do us great good. We feel honored in your presence, and simply desire that you will show us the courtesy of making yourselves at home as fully as possible. You are very welcome.

Prof. LeRoy C. Cooley—In behalf of the association, Pres. Rhees, I desire to thank you heartily for your cordial welcome to the university and to the city of Rochester. The kindness of your greeting has intensified our pleasure in coming together. We are glad that we are here; and I am sure that our appreciation of the hospitality tendered us is commensurate with the cordiality of your generous welcome.

You have referred to our association and our work in terms that lead me to believe that I need not now enter on any details in regard to its purpose or its methods. You know already that

we are a people devoted to the promotion of science as an educational agent. You know that we have come from the classrooms and the laboratories of the elementary and secondary schools, of the normal schools, of the colleges and of the universities to talk over past experiences, to compare notes in regard to the progress of the work which we have at heart, to enjoy the pleasures of mutual acquaintance and good-fellowship and to discuss methods by which to enable this great department of human knowledge to bear an honorable share in the preparation of the young for the manifold duties of citizenship.

The kindness of our hosts is one of the inducements to us to make this meeting, if possible, the very best in the history of the association. I know that this will be a difficult task, but we have on our excellent program papers on a great variety of educational subjects. Some deal with those practical details that are supremely important to all who are interested in the actual work of using science for educational purposes. Others deal with the philosophy which shapes our purposes and the principles which underlie our practices. Moreover, those who have consented to prepare these papers and discussions are recognized as most successful specialists, whose eminent scholarship and long experience in school and college work entitle them to speak on the subjects involved. We therefore hope that, during this meeting of the association, our hosts from whom we are to receive so much, will be able to receive something of interest and profit from us in return.

I can not let pass this opportunity to thank the association for the great honor it placed on me in calling me to be its president, and to express appreciation of the courtesies which have been extended to me while I have attempted to discharge the duties of that high office. The last of these duties I now discharge. With keenest pleasure I introduce to the association its new president, Prof. Charles Wright Dodge of the University of Rochester.

Prof. Charles W. Dodge—I wish to thank the association for the great honor it has conferred on me in electing me president for this year. It is not only an honor, but a great privilege to be the president of this association, representing as it does the entire

But what shall we mean by method in this discussion? Not the mere use of tools of any sort, however complicated and invaluable; not the manipulation of apparatus, or any form of mechanical operation on anything. Tools, apparatus, and laboratory manipulations and experiments are helps to observation, indispensable often in the accumulation of facts, but they do not themselves accumulate facts, and they do not in the least help to organize the facts accumulated, or to reason on them when organized. The method of even physical science is indeed a mental method, and the study of this method is a study of the action of the scientific mind while engaged in the pursuit of scientific truth. The subject is thus not physical but psychologic, and the question which we wish to find an answer for is, I think, substantially this: What are the general features of mental method common to all sound and successful investigations in the physical, or concrete, sciences? This is a question of the greatest importance to us all, for this method of science must always be our final means of defense against the ravages of unbridled fantasy in the field of general truth; a defense never more needed than now by that mass of the ignorant, the partly educated, and the poorly educated, who still make up the great bulk of humankind. I shall try to answer this question as well as I can in a little time by giving an outline description, brief and necessarily somewhat crude, of the various steps or stages in the method of the scientific man engaged in the serious study of a new, difficult, and complicated problem.

The first step in any such study is the investigation of the investigator by himself. He is to look on himself as his own apparatus of research, certainly defective in various ways and never capable of being fully perfected for its purposes, to be studied therefore with a view to correcting its action where possible, and of guarding against its deficiencies and allowing for its irregularities where this can not be done. What is the temperamental bias of the investigator? Is he unduly optimistic, or is he too easily discouraged? Is he already committed to general views which are likely to create a prejudice in the

case which, as the lawyers say, it will take evidence to overcome? Is he too quick to generalize and thus likely to proceed under the influence of premature opinions; or is he overcautious, hesitating to draw conclusions which are warranted by the evidence, and thus likely to stand in his own way and block his own advance? Has he a well fixed habit of sure and steady work, such that he may safely close each stage of his investigation as he finishes it; or must he go over each step of it again and again, suspecting his own thoroughness and exactness, till everything has been tested in every way he can contrive? These are examples merely of the searching questions which the conscientious investigator puts to himself till he is sure that he understands himself thoroughly as an apparatus of investigation. And he can not finish this task of scrutiny, discipline and self-correction once for all, settling down thereafter satisfied. He is fortunately organized indeed if he does not have to keep a close eye on himself for a very long time, as one liable to relapse into the inaccuracies of the ordinary untrained man, or to fall incautiously under the influence of original defects not yet wholly overcome.

His systematic research he will begin by an accumulation of the facts necessary to a study of his problem—if these have not been already accumulated by himself or by some one else—and he will be specially watchful at this point that no superfluous assumptions slip unnoticed into the company of his primary data; no assumptions, that is, which are not necessary to the beginning and the continuance of his work. There is no error in pseudo-science more common than this perfectly fatal one of a conscious or unconscious assumption in the beginning, of things not known and not in the nature of the fundamental presuppositions of scientific thought. Assumptions we all of us must make every time we rationally think and every time we deliberately act, but it is a fundamental principle of scientific law that the investigator shall make no assumptions not necessary to the constitution of his science and to the use of its legitimate method. If a physicist, he will not call in ques-

tion the real existence of energy or motion or the validity of the mathematical laws which he makes use of in his reasoning; if a biologist, he will assume the soundness of the generally received conclusions of physics and of chemistry; and, whatever his specialty may be, if a scientific man, he will not as such question the real existence of an objective world, the truth of the law of causation, or the principle of the uniformity of nature. These are assumptions so necessary to his purpose that, if he could work without them at all, it would only be at an enormous expense of labor and convenience. He may be perhaps a thoroughgoing idealist in metaphysics, but when he steps into his laboratory, he leaves all that behind him, for there he thinks in other terms, and his mind speaks a language which he could translate into the dialect of idealism only by using the dictionary on every word. And in the accumulation of his facts, he will see—as well as he can at this stage of his procedure—that each is well and thoroughly known; that all are pertinent to his end; and that they are sufficient in number, variety, range and bearing to furnish a strong and broad foundation for the superstructure he has planned. This is the period at which great waste of labor may easily occur through the gathering together of materials excessive in some places, deficient in others, and wholly useless, because inapplicable, in others still. The end in view, the question to be answered, must be carefully kept in mind as a guide to choice.

Then, as he goes on, or after this accumulation stage is passed, he classifies his more or less complex material, he assorts his facts in bundles of like kinds, putting a general label on each one, and goes on perhaps to make larger bundles of these bundles, and then larger bundles still of these, so labeling each package as he goes that he can thereafter use the general label as a substitute or symbol for the compound package itself. And this classifying and generalizing process is also guided by the end he has in view, and the generalizations reached by it will all be such as have a bearing on the subject of his inquiry. If he does not thus directly reach the general truth of which he

is in search—and in a difficult subject he commonly will not—he will at least greatly limit the field of his inquiry. Among his several generalizations may be one or more which will seem to point the way to the true law or principle which he seeks. And then he begins to guess—within limits; he turns his imagination loose—under guard; he invents hypotheses—consistent with the facts; he employs the method of multiple hypotheses, perhaps; that is, he imagines all the various theories he can think of which are not contradicted by the facts as they then appear to him, and somewhere among the fish now tumbling into his net he expects to find the one with the golden coin in its mouth.

So far we have followed the accumulating, the combining, the inductive side of the method of science, but now, having reached our higher generalizations or our tentative hypotheses, one or more, how can we choose with certainty between them; how may we know which of them is true, or whether any one is true? We must proceed somewhat as the pupil does at school when he proves his division by multiplying divisor and quotient to get the dividend; that is, we must reverse the process, and, having reached certain general conclusions by induction from particulars, we must now reason deductively from these general conclusions to particulars again, and then must compare our reasoned-out particulars with those derived from observation or experiment. We do this not only once, but again and again, in as many ways as we can think of, and if all turns out as it should by our hypothesis, then we are sure that our problem is correctly solved. If we are dealing with several mutually inconsistent hypotheses instead of one, then we reason out the various consequences of each, compare all with the facts, previously known or subsequently ascertained, and exclude those hypotheses which are not sustained by this method of trial, this verification process as it is commonly called.

The accumulation of pertinent observations, the classification and generalization of them, the framing of hypotheses from the materials thus obtained, deduction from these hypotheses and

comparison of the products of these deductions in every way possible with new facts till substantial certainty is reached, these are the general steps of the method of physical science. It is time to say, however, that in practice, and specially in some of the sciences, this whole round is rarely followed out in full. Short cuts across corners, abbreviations or even omissions of certain steps of the process are often possible to the expert, who may see, as by a flash of judgment, whither an investigation is tending, and so jump to the point at once; but even an expert may not dispense with a sure starting point and a rigid verification. If one omits or obscures these, we may know that he is not even a scientific man at all.

In physics or in chemistry a single observation or experiment is often enough to suggest to an acute and fertile mind a hypothetic explanation which brings the experimenter at once to the verification stage of his inquiry. In many departments of science vast masses of material have already been accumulated, classified, and generalized in advance, ready for the use of any one; and investigation in these departments may begin with imagined hypotheses, followed by verification through experiment and by added observation. In mathematics specially, induction was long ago practically completed, and the mathematician is occupied now only with deductive and verification processes. Physics and chemistry also have gone some distance on the same road, and general laws have been established in considerable number and of extensive scope, from which deductions may be made at once, and by reference to which new facts may be explained without the tedious preliminaries of extensive observation and repeated generalization. In the vast field of biology, on the other hand, full as it is of the most perplexing complications, few stable generalizations have as yet been reached, and there most students are still busy with the inductive side of the operation. They are working toward general propositions, while the mathematicians and physicists are working from them. Induction predominates, in short, in the more complicated, that is the less developed, sciences, and the deductive method in those which are far advanced.

The appreciation of these differences of method in the different related sciences is of great practical importance, since it is not an uncommon error to apply the method of one science in the field of another to which it is not appropriate. One trained mainly in chemistry, accustomed to infer with certainty the characters of a whole class from the results of an examination of his first example of it, knows little of the tedious repetitions of observation on multitudes of individuals, and the complicated processes of generalization necessary to establish class characters in zoology or botany; and the mathematician, accustomed to go at once to his general principles as an unalterable point of departure, can scarcely appreciate the requirements of an investigator who must start from individual instances, with general principles as the halfway house to his goal.

I must next make brief reference to two kinds of operation which, though they may not properly be described as parts or even varieties of the strict method of science, are, nevertheless, so helpful in scientific research, of such constant utility for inductive investigation, that the practical investigator would spare almost any other tools from his workshop as willingly. These are reasoning by analogy and the calculation of averages, the latter often used as a basis for the estimation of probabilities also. Analogic reasoning and the estimation of probabilities are indeed such clever tools and so convenient to the hand, they work so easily and so rapidly, that one is often strongly tempted to pick them up when only a heavier instrument and a slower operation are really adequate to the task in hand. On this account they commend themselves specially to the unscientific as a substitute for the scientific method. The principle of analogy, "like causes produce like effects," has a very plausible sound, and, if it were always and strictly true, it would save an immense amount of minute comparison and critical analysis of things which are clearly much alike, but not certainly like enough or like in the right way. What the untrained man will accept as a conclusion, and proceed to act on, the trained man will use as a promising hypothesis merely, not to be fully accepted till

verified. But in the suggestion of hypotheses the method of analogy has a brilliant record in the annals of science in every age.

Scarcely less useful and scarcely less treacherous is the method of averages and the estimation of probabilities. From an imperfect examination of a part to assume a sufficient knowledge of the whole, is one of the forms of the abuse of a method which, properly used, enables the student to penetrate to definite conclusions through thickets of difficulty which would otherwise be wholly impassable to him.

I am not at all sure that my abstract description of the process of the scientific search for truth has been sufficiently clear to all of you to permit me to dispense with concrete illustration, and it may prevent misunderstandings and remove ambiguities if I illustrate it by some two or three examples. Let us take first a plain and simple problem, to the solution of which the full round of the scientific method may profitably be applied. I should like particularly to take an illustration from the work of one of the agricultural experiment stations, because these are excellent examples of organizations for strict scientific research, the thorough method of whose work is too little appreciated, and the educational and scientific value of whose results is too little known.

Let us suppose that an experiment station assistant is charged with an investigation intended to lead to a discovery of the best method of feeding stock for the purpose of growing them rapidly and fattening them early with the greatest economic profit. He might conceivably begin in any one of several ways, but he will most likely first avail himself of the various conclusions of other men, scientific and practical, who have had experience or made investigations in his field, adopting their announced results as his hypotheses merely, and proceeding at once to test them by deduction and experiment. That is, he will assume that the necessary accumulation and generalization of data have already been done by other men, and that he can omit these first steps of his research. Suppose, however, that he lacks confidence in

previous work, and feels it necessary to begin at the very beginning for himself. Under these conditions he would probably first search out and bring together the largest possible number of instances of marked success in cattle feeding, with full particulars of the conditions and procedure in each. For comparison with these he would collect a large, if not an equal, number of unsuccessful instances. Each set of cases he would then compare among themselves, the first with a view to ascertaining what were the common features of the food and of the treatment generally in the practice of the successful feeder; the second to see also what common features could be distinguished as characteristic of unsuccessful practice, but specially to see whether those found characteristic of the successful group were wanting in the unsuccessful. In this manner he would analyze his data by what is known to inductive logicians as the joint method of agreement and difference. Remembering that a multitude of factors would affect results, besides the kinds of food made use of, that some of these factors would be favorable and others unfavorable in each group of cases, and that the effects of feeding would thus be more or less obscured, he would not stint himself in respect to instances, for the larger his accumulation the more completely these obscuring tendencies would counteract each other, leaving the different effects of different food to stand out clear and unmistakable. He would apply the method of averages, in short.

The general propositions thus arrived at as to the practice of successful feeders would at least contain materials for hypotheses concerning the most successful feeding practice possible, and these hypotheses our experimental agriculturist would next proceed to frame, and, with them in mind, he would arrange his scheme of experimentation to test them separately. And, knowing, as he will, that in the rearing of every animal, no matter how carefully chosen and skilfully handled, peculiarities of constitution, of condition, and of treatment are sure to occur, such that no safe inductions can be made from single instances, he will multiply identical experiments and eliminate

as to situation of the various species of fish under varying conditions and at different times of the year, together with any similar matters which might come to our net. Guided by analogy, I undertook to transfer and adapt to ichthyology the statistical method of research, the method of averages that is, which has brought an abundant harvest of new knowledge to the student of the forms and multitudes of minute aquatic life. Many fish traps and nets of uniform character were kept continuously set for eight months, from August to April, or were used at regular intervals in carefully chosen situations. The product of each net and trap was determined and counted for each species every few days, and later the data as to species of fish and the relative numbers of each were tabulated for each situation and each date. These collections and observations were the primary data of our investigation, so grouped and classified in the tables as to disclose the general conclusions of which we were in search. By a comparison of totals and averages for the various situations in our field it was learned, among other things, that the fishes of the locality are divisible into three main groups, inhabiting respectively the river, the lakes, and the creeks. These groups are distinguished not by differences with respect to the presence or absence of species but by differences in their relative abundance, and they are clearly recognizable even where there is a free open-water connections between their habitats. The river fishes are in general the oldest and the least specialized, and the most closely related to those of the Mississippi, into which indeed all of them still range, a few migrating from the gulf. The fishes from the bottom land lakes are, on the whole, more recent forms than those of the river, smaller, and more highly specialized. Those of the creeks are smaller still and most highly specialized of all. Farther, the Illinois river at the situation studied is frequently muddy on one side and clear on the other, owing to differences in the banks and the character of the entering streams. Where this difference exists, clear water and muddy water groups of fishes are distinguishable, but, when for any reason this physical difference is obliterated for a time, the distinction

of these groups is obliterated also. The spring migration impulse connected with the search for breeding grounds likewise confuses all these groups for the time being in a general movement up the streams and into shallow water. Each of these generalizations, I need hardly say, invites to additional research, as to its general and uniform validity and as to the causes of the phenomena which it sets forth.

The preponderance of observation, classification, and generalization in biologic work over deduction and experiment is illustrated by the foregoing, but better still by the general operations of our biologic station during the past six years. Founded in 1894, specially for the experimental investigation of oecological subjects, this station has now published several hundred pages of contributions to knowledge and has some hundreds more just passing through the press, but has not yet reported or matured so much as one experiment. This is because in such a field one can not even see the outlines of the special problems to be worked on till its contents have been surveyed, classified, and analyzed, and this preliminary procedure is with us scarcely yet complete.

I think that I need not farther multiply instances of the application or the variations of the method of science, and I have accomplished my present purpose thus far, if I have given you an outline of its main features comprehensible to those not already familiar with the subject, and have opened the way for a discussion of the relations of the scientific method to the teaching of the sciences in our public schools.

At this point I specially feel the necessity of proceeding carefully, since my opportunities to learn by personal observation or by authentic report what is actually done in the science work of the schools are much inferior to those of many here present. On this account, I will limit my comments to certain methods of science teaching, wherever used, considered in relation to the method of science as above described. Take, for example, the laboratory method in biology, commonly so called. The student under instruction by this method sits at his table with a lifeless object before him of more or less complicated structure and a

book beside him, which is essentially a manual of directions as to the mechanical routine of his work, a nomenclator of the parts of the object under his examination, and a more or less definite description of it, with broad intimations and pointed hints as to features not specifically described which it is desirable that he should see. He reads the book, he does the things he is told to do, he looks at the things he is told to see, he observes and records and draws, and he listens to the remarks of his instructor, and in it all he does not so much as lift one foot from the earth on which rests the lower end of the ladder which we call the scientific method. From our standpoint this is all prescribed and directed observation merely. If, in passing from object to object of the series laid out for him, he makes comparison of one with another, noting resemblances and differences between them, then he does lift his foot as if to place it on the lowest round, but he can hardly be said actually to place it there unless he goes at least so far as to frame a definition of a class by combining the results of these comparisons into a list of characters common to the group. Even the determination or identification method, if we may so call it, despised and rejected of teachers of biology for these many years, carries the student at least as far as this in the practice of the scientific method, and gives him at the same time a more exacting elementary drill; for one can not determine a plant or an insect species without close and careful observation or without answering positively for himself, yes or no, to a considerable series of questions, each compelling the comparison of his visible object with a conceptual image.

If we turn to what I suppose to be the more common methods of instruction in the chemical and physical laboratories of the public school, we find no very unlike condition of things so far as I now see. A chemical determination calls for a very different mechanical procedure from that of a botanical or an entomologic one, but the mental act is almost precisely the same. The student observes his mixture of substances and compares its behavior or the product of its reactions with certain descriptive matter in his book or in his memory, makes an identification

based on that comparison, and with this elementary classification process his use of the method of science commonly seems to stop. In the physical laboratory his work is either illustrative of general principles taught him, or, at the best, he works out what is called a problem: given such and such an apparatus to prove by experiment such and such a law. His procedure is practically dictated, and his result is predetermined. If he reaches a different conclusion by his experiment from that prescribed to him in advance, which is it that he doubts, the experiment or the law? Unquestionably the former, and he works it over and over again, if necessary, till the answer to it "agrees with that in the book." This seems to be largely a drill in a mechanical operation rather than a practice in a mental method.

We must distinguish between a study of science and scientific study, between instruction in science and scientific instruction. If by scientific we mean "pursuant to the method of science," then the courses just described are unscientific, and instruction in them is instruction in science, it may be, but not scientific instruction. If we would teach science for its method, we must so teach it as to bring that method into play; and this must be our main object and not a secondary or supplemental one. This means, as it seems to me, that we must supply the materials and aids and favoring conditions for untrammeled observation, for independent induction, and for experimental verification, and that we must furnish suggestive models of the method of research. These things we must do with at least as much care, ingenuity, and precision as have been displayed in our efforts to transplant into the high school and to adapt in its work the methods, equipment and ideals of the university laboratory of morphologic research. I do not in the least doubt that by thus making possible some knowledge of this mental method and some general exercise of its application we shall be doing a great service to education and the state. For the method of science is not to be understood as a method for the scientific merely; it is to be taken as a general method of certainty. It is the only means of certain conclusion, over much the larger part of knowl-

edge and experience. Even when the conclusions reached by it are themselves uncertain, it helps us to a certain knowledge of the degree of that uncertainty. It is the method of valid results in the objective world, of secure foundation for thought, of certain warrant for sustained and complicated action. To the practical man it is mainly useful in ordinary life as a measure or standard of certainty. He can rarely wait for its full and formal application to the small affairs of business, but must approximate its decisions as well as he can and take his risk of error as in the end the most profitable course, but it is extremely useful to him to have some means of judging what that risk may be; and in great affairs of business or of state, where expense of time, of labor, and of thought are justified by the gravity or the permanence of the interests involved, then it is the prime safeguard of enterprise, the promoter of welfare, a powerful instrument of progress. I think of it often as a simple but mighty engine composed of a few great bars and bolts, variously changeable in form and articulation, wonderfully adaptable to widely different purposes, fit to point a needle or to pound out a walking beam, by whose sole and sufficient aid the great builders of the past have reared the permanent framework of our civilization. To have one's hand on the lever of it with the knowledge of its mode of action and its powers is to be a modern man, equipped for modern life. To be ignorant of it or indifferent to it or contemptuous of it is to be exposed, helpless and unconscious of the need of help, to innumerable follies, quackeries, and superstitions ruinous to oneself and dangerous to society. To bring within the reach and privilege of the youths and maidens of the present day something of the knowledge and use of this great source of power, this is surely one of the serious obligations of the science teacher of the modern public school.

Prof. C. W. Dodge—The paper that we have just listened to was written by a man who has probably trained more working naturalists in the line of zoology than, I suppose, any other teacher in the country. It is rare that you come across a man

who can take you out in the field and tell about the things in the streams and trees, and so on, who has not at some time or other either been a student of Prof. Forbes's or got a large part of his knowledge out of the contributions to the science which Prof. Forbes and his colleagues have made.

We should like very much to hear something on this subject from Dr Beal, who occupies the chair of botany at the Michigan agricultural college.

Prof. W. J. Beal—As I am to speak this afternoon, it is hardly just to present these points at this time. I was very much gratified in listening to the interesting paper of Dr Forbes, whom I have known a long time. I know of the men he has trained in this way, and I am glad to know how well we agree in some points. I congratulate myself on that. As I approve almost everything he said, I had better not take time just now to say anything more.

Prof. C. W. Dodge—Quite a number of allusions were made to the teacher of physics specially. May we hear from you on this interesting subject, Prof. Carhart? I think we are all pretty well agreed as to what the scientific method is, but we rarely hear it so plainly set forth as in this paper. We should be very glad to have you say something in the discussion of the paper.

Prof. Henry S. Carhart—I might offer the same excuse as Prof. Beal for not saying anything now, though I had not intended to discuss exactly this phase of the subject this afternoon. The president has well said that the general outline, as given by Prof. Forbes, of the scientific method is correct and exact. We all agree with him; and I have been very much interested in what he has said. Speaking for my own subject, particularly as applied to the secondary schools rather than the universities, it has seemed to me, while I was listening to the paper, that possibly there is a distinction to be drawn which was not drawn by the speaker, and which may perhaps throw a little light on the method of procedure in secondary schools. Prof. Forbes has outlined clearly and sharply the method which we must

pursue as investigators—the method of scientific investigation. I do not think there can be any question about this at all, that an investigator must train himself to be sure that he as an instrument is properly employed, and that he must employ substantially the method that has been approved for a great many years by the best scientific inquiries. But in the secondary and public schools we have to deal with youths who are not investigators, who know nothing about science to begin with, and we can hardly expect to make investigators of them while they are in the secondary schools. I do not mean to say that they will not find out things they did not know before, through their own guided efforts, but the distinction I wish to make is perhaps between the teaching of science and scientific investigation—the methods to be used in the teaching of science, specially elementary science, and the method of investigation. There is a great deal of good to be obtained on the part of the student in the secondary schools studying science in an elementary way, in his verifying for himself well established laws that have come through investigations. Of course there are formulas in the book derived from investigations that the student can not repeat in full, but he can verify the laws that he learns from the book.

He must learn physical manipulation, because, whatever science he is engaged in, he must learn to use his own fingers, to use his own eyes, to draw his own conclusions. He should do that, though he simply verifies laws, and not everything should be pointed out to him. Of course suggestions may be given, but enough will be left of the unknown or the undetermined to make the subject attractive when presented to the learner or the beginner. He is finding out that he needs to learn, needs to cultivate his manipulative skill, to cultivate the power of observation; and another thing he will learn is that, however careful we may be, we can only approach in our scientific experiments more or less near to the goal which we set out to reach; that is, we shall find unavoidable variations in

our results, coming partly from apparatus which may be imperfect, partly from the method, which the student may himself improve, and, above all, coming in part from the personal equation. Perhaps, if we view the teaching of elementary science from the point of view that it is the teaching of the scientific method rather than the method of investigation, we may have a little more good to say of the work that is done in elementary or secondary schools.

Prof. C. W. Dodge—Are there any others who have as valuable thoughts to give us on this subject, as we have just listened to?

Prof. Frank M. McMurry—I should like to put simply one question to Prof. Forbes. I should like to know to what extent he feels that this general scientific method is applicable to ordinary school subjects, even below the high school; whether or not the method is practically universal and ideal, and to be applied in geography or history or literature, as well as in science itself.

Prof. S. A. Forbes—I think it will be prudent for me to stay within the propositions of my paper and not to undertake to enter on the inviting but unaccustomed path which Prof. McMurry points out to me. I have merely attempted, under the instructions of your committee, to open the general subject, and shall be glad to leave the discussion of its details as affecting the various departments to the gentlemen representing those departments whom I see present in the audience, and whose names are on the program of this meeting. Indeed, from what I know of Prof. McMurry, I surmise that he has an answer ready for his own question.

Prof. McMurry—I rather believe that Prof. Forbes, himself, has thought a great deal about the matter; and I should like it, as a representative of public school work, if the scientists who believe in induction would urge it more as a general matter, because I think the public school teachers need it sadly. I do not know that you care to have that matter discussed.

I have one other question which I want to ask: Is this scientific method to be held before the student as his primary aim or is it

the primary aim only of the teacher? And shall something else be the main purpose to the student, whether he be in the high school, in the college or in the grades?

Prof. S. A. Forbes—Of course, on a pedagogic subject relating to the work of the elementary schools, I can speak as a layman only, but it seems to me that the standards of the method of science should undoubtedly be kept in the teacher's mind as an elective and selective influence, and not usually given to the pupil. It might perhaps be stimulating to him, however, that he should occasionally be made to understand that he was working in the same field and to some extent by the same methods as the scientific investigator, exceedingly elementary though his work might be.

Friday afternoon

SECTION MEETINGS

Section A. PHYSICS AND CHEMISTRY

THE PLACE OF PHYSICS IN A LIBERAL EDUCATION

BY PROF. HENRY S. CARHART, UNIVERSITY OF MICHIGAN

The latter half of the century at whose very close we stand, has witnessed profound and significant changes in the materials which are used to impart a liberal education. The object aimed at remains, however, the same from age to age. The training of the intellectual powers so that the educated man can employ them with the highest efficiency in all positions calling for the exercise of his intellect, constitutes the chief object to be attained by study directed to purely mental ends. I do not wish to be understood as implying that moral training should be divorced from intellectual culture; but my theme deals chiefly with the intellectual rather than the ethical aspects of education.

The narrow curriculum of the college half a century ago has given place to the varied and differentiated university courses of the present. The sciences, though at first unwelcome guests, are now acknowledged members of the family circle. The mod-

ern languages have reached a position of higher esteem than formerly. The philosophy of history and the study of contemporary events have supplanted the old array of dusty facts and sanguinary battle records. Even in the primary schools the inspiring practice of waving the revolutionary "bloody shirt" in the faces of our British friends across the sea is happily becoming obsolete. The English language and English literature are now considered as worthy of study as the languages and literatures of peoples that long since ceased to be. Political economy and sociology are subjects of recognized standing and attract large numbers of students. Even philosophy, by a process of peaceful acquisition, has allied itself to science by including experimental psychology within its colonial domain.

Not only has the past half century witnessed an enlargement of the subject-matter of a liberal education, but a revolution has taken place in the methods of using educational material. Second-hand knowledge has taken a secondary place as compared with information gained at first hand. The sovereignty of the textbook has yielded to the sovereignty of nature. Knowledge by authority is giving place to knowledge by conviction. Museums with locked cabinets of natural history or of antiquities may be admirable objects to meet the demands of public curiosity, but they become educational appliances only when the student has access to their treasures and can study them by actual contact.

A significant change has taken place also in pedagogic practice. The method of investigation, as compared with mere memoriter acquisition, has been introduced with the serious study of physical science into our American universities. The experimental method adopted by science and its practice of original investigation have compelled other departments of learning to become its imitators. Even the classical languages now boast of their laboratory. Archeology has its workroom; language its photographs and lantern, its casts and reproductions of ancient life and times; while psychology has appropriated the apparatus of the physicist along with his methods.

50 years ago the laboratory method of teaching chemistry even was a novelty. It was not till a later date that physics adopted the same method and founded physical laboratories. The remarkable investigations of Regnault near the middle of this century were made possible at first by the appliances furnished by the Royal porcelain works at Sevres, of which he was the director, and later by the gift of English money. In England science was advanced by the enthusiastic labors of gentlemen of fortune, who devoted their time and money to this purpose. A fortunate combination of talents secured for England much scientific renown. Now every scientific department in a university is a constant contributor to the advancement of science. The scientific method and the scientific spirit have become general. In such an environment the place of physics in a liberal education is more readily ascertained than under the conditions prevailing in the middle of the century.

The first proposition which I wish to establish appears to be almost or quite self-evident. An education can not be comprehensive, free from narrow limitations, inclusive of the best things that go toward the making of a man, unless it comprises more than the time-honored humanities. It is unnecessary at this point to dilate on the humanistic elements in science, those features that connect it indissolubly with human interests, nor to depreciate linguistic and philosophic studies. But, if a study of the highest types of ancient literature gives an insight into the thoughts and feelings of the cultured past, and if it makes the student feel that he is allied to all that is most glorious in ancient history, so also does the study of history in the mother tongue have an equally emancipating effect on the mind. No one group of related subjects possesses the exclusive control of culture. If today the humanities should form a trust in their exclusive product of liberal culture, they could not control the output. The range of liberalizing studies has been greatly extended within 50 years. It is at the present time no less illiberal to contend that a liberal education is the exclusive function of the traditional subjects than to assert that it is the

exclusive product of scientific study. The well trained, evenly cultured man is one who has laid a broad foundation for his specialized superstructure. Intellectual power is the prime object of education; but the power imparted by a single subject is usually specific and not general. Any study may have a tendency to fit one for special activities, but it rarely fits for activities in every direction. Hence the student whose intellectual diet is limited to the traditional menu may or may not acquire an easy, graceful and discriminating use of his mother tongue. It is of the highest importance that he should do so, but the study of mathematics and the classics chiefly or alone can never give mastery in dealing with the many-sided activities of life, in which language is not the most important factor. If to the traditional subjects are added science, civics, history and commerce, then more intelligent interest will be awakened, and power will be cultivated in other directions than those leading to the legal and clerical professions. The young man who has completed his general training with such a scheme of study, finds himself in harmony with his environment, when he enters active life, where he must make his own way if it be made at all. The student who gives almost exclusive attention to classical studies may succeed in getting in touch with the distant past; and, if he does, he will probably find himself out of touch with the present. Even a culture course should be broad enough to take in living human interests.

One of the decisive tests to be applied to determine the educational value of any study is the interest which it excites in the mind of the student. Judged by this criterion, physics claims a prominent place in every curriculum. He must be a dull boy whose interest is not awakened by the explanation of the most glorious and the most curious phenomena of nature. His enthusiasm is excited when he learns for himself that the events of the natural world are not fortuitous and incomprehensible, but are reducible to natural causes and are subject to the reign of law. This interest and enthusiasm are hightened by the knowledge that man has utilized natural forces and laws

so as to produce the most beneficent results for the human race. He soon learns that invention follows discovery, and that the real pioneer is he who wrests from nature her secrets, and discovers the causes and relations of things. We are only just beginning to comprehend that Faraday in his laboratory in the Royal institution in London wrought a social and economic revolution by his discoveries of greater importance and more enduring than the political revolution of Napoleon, which only temporarily changed the face of Europe. Napoleon made and unmade kings as if they were puppets to do his bidding; but the slate of Europe which he made has long since been wiped off. On the other hand, the discoveries of Faraday have changed the civilization of the world within the last 30 years. And every decade only adds new applications of his discoveries, for they underlie every electric generator, motor and transformer. Electric lighting, electric railways, and the transmission of power, as at Niagara, are some of the beneficent results of Faraday's immortal discoveries. Yet there are some who tell us that the study of physics does not touch the secret spring of human interest and human activity with the same certainty as does the study of the ancient classics; that physics does not offer the persuasive attractiveness that inheres in the classical languages and literatures. Grant that physics appeals to the immature mind in a different way from the study of language; nevertheless, it appeals strongly in the hands of a live teacher, imbued with the dignity and interest of his subject. Testimony of parents is not lacking, that the first notable intellectual stimulus received by their children came through the study of physics. The taste for science is as natural as the taste for language, and both are necessary elements in a healthful intellectual diet.

Another element which should weigh in an estimate of the educational value of physics is the kind of training which physics furnishes. Its pursuit contributes to exactness of reasoning, of thinking, and of expression. Physics includes a great body of laws and relations which admit of precise quantitative statement.

The student of physics finds a subject which busies itself with the reason of things. Its business is to account for natural phenomena in the simplest possible manner. Causal relations are among the most prominent of those studied. An earnest study of physics, specially by the laboratory method, disinclines the student to rest on the authority of a textbook. He learns to try all things and to hold fast that which is good. Without losing respect for the opinions of others, he learns to discriminate for himself. In the laboratory he has ample opportunity to form independent judgments. His work contributes to the making of a man who not only knows but does. The student in practical physics "must acquire a certain technic, a deftness and certainty of touch, an ability to handle and adjust apparatus, which, however small it may seem to be in itself, forms one of the characteristic differences between the civilized man and the savage". There is a close but almost indefinable relationship between manual and mental training. Manual dexterity begets mental agility. The refinement of the mind expresses itself in the refinement of manipulative skill. Trained fingers and a trained mind give the possessor a double claim on public appreciation. The artistic instinct and artistic appreciation do not make an artist. To these must be added dexterity with the brush, the pliable fingers, the mallet and chisel. Musical feeling expresses itself at the very finger tips. The hand is often as good an index of character as the face. The combined mental and manual skill cultivated in physical manipulation is no mean reward for the time devoted to it.

Physics has also other and perhaps higher motives. It considers not only the things which are seen, but still more the things that are not seen. If it has to do with many-sided matter, it has also to do with many-formed energy. The most important and most fascinating phenomena of physics are not the things one can see, but the invisible things that one apprehends only by the use of the imaginative faculty. It thus happens that the serious study of physics cultivates in no small degree the power of imagination. Force is invisible, though matter is its medium;

energy is invisible, and so difficult is its apprehension that even cultivated men fail to distinguish between it and force. An electromagnet is a simple electric device; but, when we contemplate its attendant magnetic field with invisible magnetic lines in the invisible ether, and try to picture to ourselves how energy is transmitted and transmuted through the agency of this invisible magnetic halo of gossamer threads, the imagination is taxed to its utmost capacity. Consider farther the fairy land of light, the audience hall of sound, the seething caldron of solar heat, or the appalling chill of liquid air, of interstellar space, or of the deathlike immobility of the absolute zero of temperature. Follow, if you can, the flow of radiant energy with the speed of light through boundless space, and tell us whether the Almighty, who let it fly, corrals it again and holds it in leash in some unknown rendezvous on the boundary of the infinite. The discoveries of physics outrun the imaginations of men. When the first report of Roentgen rays was bruited abroad, we received it with incredulity. That an exhausted glass tube, excited with electricity, should render visible the bones of a living man, and enable one to see the pulsating heart, was a unique fact lying beyond the realm of fancy even. Not less extraordinary were the discovery and measurement of Hertzian waves excited by the electric spark, followed by the marvelous application to space telegraphy. Discoveries often require the suggestion and stimulus of the imagination. Without doubt there is still worth unrecognized in the material things about us, which needs the touch of genius, aflame with the fire of imagination, to reveal. We need only call to mind "the ages during which men saw the kettle boil and the lightning flash without learning the worth there is in steam and electricity."

One more reason only do I need to give for the serious, contemplative pursuit of physics. By no means the least among educational values is the ethical aspect of a subject. The making of a man is seriously compromised by the lack of moral tone. Education that may cover the whole range of the intellect, and yet fail to produce seasoned moral fiber, is not entitled to be

called liberal. Intellectuality divorced from morals is a misfortune to the individual and a menace to society. Judged by the ethical standard, physics is entitled to respect, not because it teaches formal morality, but because of the indirect yet powerful influence it brings to bear on the serious student. If it teaches anything, it emphasizes the reign of law. No shifting or pretense relieves him who sins against nature's laws.

Moreover, there is every motive of personal interest to honesty in the physical laboratory. The only object of the work is to find out the truth, and there can be no possible reason for preferring an incorrect result to a reliable one. Indifference as to what the result is to be, unflinching honesty in dealing with determinations, and patient revision and verification of values, are the ideals which are impressed on the student in the laboratory. When the law of the conservation of energy has been assimilated by the student, he will know that it is impossible in nature to get something for nothing. Whenever energy is concerned, an equivalent must be given for all we get. The physics student is always engaged in verifying old truths or in the discovery of new ones. Prof. Rowland says: "I value in a scientific mind most of all that love of truth, that care in its pursuit, more than any other quality. This is the mind which has built up modern science to its present perfection, which has laid one stone upon the other with such care that it today offers to the world the most complete monument to human reason."

I have briefly sketched some of the beneficial results to be expected from the serious study of physics. Have I drawn the outlines of an ideal pupil in an ideal school, and does the reality fall short of the ideal? Undoubtedly in many cases it does. Whether physics yields much or little depends first of all on the qualifications of the teacher. The solution of the whole problem rests with him. But this condition is not peculiar to physics. The same may be said of any subject of study. The classics and mathematics have had the training of teachers for centuries, and even these subjects often suffer at the hands of their friends. Till a very recent time it has been assumed that the classical

graduate was competent to teach "any of the minor branches," as one of them expressed it, and that no special preparation for the important profession of teaching science was necessary. It is a matter of congratulation that in many localities at least normal graduates are adding university study to their preparation, and graduates with a bachelor's degree are returning to the graduate school to fit themselves for effective work as science teachers in secondary schools.

In certain university circles too much stress has of late been laid on the ability to investigate to the disparagement of the teaching ability. It is of vital importance to the teacher's influence that he should lead the way by his contributions to the science which he cultivates. On the other hand, it is no mean accomplishment to be a teacher of the best type. The teaching ability is as rare as the capacity for research. The good teacher lives in the hearts and lives of his pupils, while his researches may lie in the unwakened slumber of unread scientific transactions. Every teacher, even in a secondary school, should contribute something to his chosen science by way of device or invention or discovery; but he should first of all see to it that he does not neglect his preparation as an instructor. Joseph Henry in the Albany academy made discoveries in electricity that attracted the attention of the scientific world and established his fame. Read his own account of his experiments carried out during the summer vacation because he could not neglect his duties as a teacher. So careful was Faraday in his preparation for his lectures that he invariably tried every glass stopper in advance to assure himself that none were stuck in the bottles; and Faraday was a prince of experimenters and eminent in research.

The inspiring teacher is a treasure-trove. Like Topsy he is not made; he grows. But symmetric growth requires cultivation and nourishment. The teacher of genuine power is not one who turns to the profession as a temporary expedient. He prepares himself for his profession with conscientious fidelity. He must have a broad and catholic intellectual outlook, and should see other subjects than his own in proper perspective and dimen-

sions. He must have the zeal of youth, the insight of maturity, and the wisdom of age. He must be enthusiastic himself, if he would arouse enthusiasm in others. He must first see clearly all around any topic before he tries to make it clear to his pupils. He must have warm human sympathies and be tolerant of mediocrity even, but he has no call to condone sloth. Devotion and diligence are the price of success. Continuous, persistent work conquers more difficulties than genius does. If the noblest prizes are for the great, many great rewards remain for the noble. If the pecuniary returns are not large, there are many compensating satisfactions. To help the deserving on the threshold of active life and to see one's pupils grow into places of power and public esteem are compensations for many personal losses.

No profession requires greater watchfulness as the years advance than the profession of teacher. Most of all, the teacher must see to it that he does not forget his own youth and so grow out of sympathy with the young. He needs to lay his course with care and to check it by frequent observations, lest he suddenly find himself far out of the intended path. To age it is permitted not merely to simulate youth, but to retain youthful feeling. The fir tree yields not its living, lustrous green to summer's sun nor winter's cold. When one reaches the period of the "sere and withered leaf," he should retire. He will never survive the "winter of his discontent" and revive with new bloom.

The teacher must also guard against overconfidence. He is exposed to peculiar temptations. He has to deal constantly with those who are not his equals in years and attainments. Hence the tendency to assume an air of authority and of confidence instead of the humility of mind that should characterize the teacher of science. It were better if he found himself frequently face to face with his peers. The stimulus of criticism from one's equals or superiors is a healthful tonic. Competition with mature minds favors sturdy growth. A large university has certain advantages over a small one in this respect. The num-

ber on the teaching staff is large enough to give room for the spur of competition and emulation among instructors. It is a mistake to assume that a poor teacher is more easily hidden in a large institution of learning than in a small one. The larger one is likely to make the larger demands. Where there are so many efficient teachers, it is more difficult for a poor one to maintain himself. Then, too, a large corps of instructors creates an atmosphere of work, an environment favorable to production. One must keep in the swim or sink. The modern American university is no cloister or refuge for the incompetent of other professions. It is a new world, a microcosm in itself. It is alive with ideas, enthusiasms, inventions, discoveries, emulations, awakenings to the higher intellectual life, the vivid foresight of brighter fields of thought, excursions into the boundlessness of space, or descents into the infinite underworld of the microscopically minute. It is in touch with the realm of thought the wide world round.

And what mighty movements have come forth from its doors in power during the past century! Scarcely a great invention of world-wide interest to humanity that has not seen its birth within walls devoted to education. Since the time when an undue respect for the learning of the past ceased to dominate the present, institutions of learning have become the sources of the most significant advances in ideas. Just at the opening of the century, Volta presented to the world the voltaic cell, and Davy produced the first electric light. A little later Oersted, in the University of Copenhagen, uncovered the relation between magnetism and the electric current, and so became the pioneer in electromagnetism. Then came Faraday with his mighty insight and his revelation of electromagnetic induction. Henry and Morse made the electric telegraph before the middle of the century; and Helmholtz exposed to view the law of the conservation of energy, which now dominates all science, pure and applied. Then Lord Kelvin taught masters of finance and promoters of international commerce how to use a submarine cable, and invented the instruments for it. Bunsen and Kirch-

hoff discovered the laws of spectroscopy, and set astronomers to investigate the composition of the stars; while Hoffman evolved new colors out of coal tar and revolutionized the industry of dyeing. Hertz discovered electric waves for future Marconis to utilize, and lastly Roentgen applied photography to a new and marvelous art, the value of which is not yet fully appreciated.

Finally, the teacher of science should strive to maintain serenity of mind. The modern university or secondary school is no longer a wooden bench with the pupils on one end and Mark Hopkins on the other. Teachers of great personality are as much a desideratum now as formerly, and as much in science as in the humanities. But science makes the more complex demands on the teacher. The intellectual and culture elements should be no less strongly developed than in other branches, while the mechanical sense and the cultivation of the fingers are essentials to success in experimentation and investigation. To the science teacher the library is as great a necessity as to the linguist or the historian; besides, he must always have his hand on the lever, ready to speed away on fresh excursions into new fields. To keep abreast of the present he is always reaching out into world-wide fields of information; to press forward into the unknown, he must catch time for thought and absorbing contemplation. All this makes a draft on his nervous energy but little appreciated by those whose daily round of monotonous duty does not open their eyes to the nature of such absorbing activities.

To be serene amid it all, to maintain one's health and composure, to expend the requisite energy and to retain enough for continued effectiveness and longevity, to grow old gracefully without losing touch with youth, to keep open the lines of communication, and to change one's point of view as the science silently changes with wider knowledge and clearer perceptions, is the problem confronting us who love our work and are devoted to the advance of our favorite subject. Is it too much to ask that governing boards consider these demands in determining schedules of work, and that they leave a little time for the

teacher to cultivate moderation, composure and serenity? Then may he appear

> Like some tall cliff that rears its awful form,
> Swells from the vale and midway leaves the storm,
> Though round its base the rolling clouds are spread,
> Eternal sunshine settles on its head.

DEVICES USEFUL FOR DEMONSTRATION PURPOSES

(Abstract)

BY PROF. EDWARD L. NICHOLS, CORNELL UNIVERSITY

I have often urged at these meetings the desirability of devoting a portion of our time to the consideration of practical physics, and it is for that reason perhaps that I have been asked to set the example today.

The devices to be described are not altogether new, and they are of a very simple nature. For their simplicity I have no apology to offer, it being a first principle of experimental demonstration that the apparatus should be shorn of every unnecessary feature which might distract the mind from the contemplation of the phenomenon to be exhibited or bewilder the student in his attempt to grasp the principle to be illustrated.

1 Apparatus for showing, in a semi-quantitative way, the expansion of air at constant pressure

In exhibiting the phenomenon of the expansion of gases by heat, it is desirable not only to afford the most direct possible ocular demonstration that expansion occurs, but likewise to show approximately how great that expansion is. The ordinary form of air thermometer fails in the latter respect, because we are unable to estimate even approximately by inspection the relation of the total content, including bulb and neck, to the volume of the mercury displaced in the process of expansion. In a cylindric vessel the volume is, however, directly proportional to the length of the cylinder, and the change of the volume between the ice point and the steam point ($\frac{100}{273}$ of the volume at 0) is so great that it can be estimated with the unaided eye. In the apparatus which I have adopted for the purpose after trying a

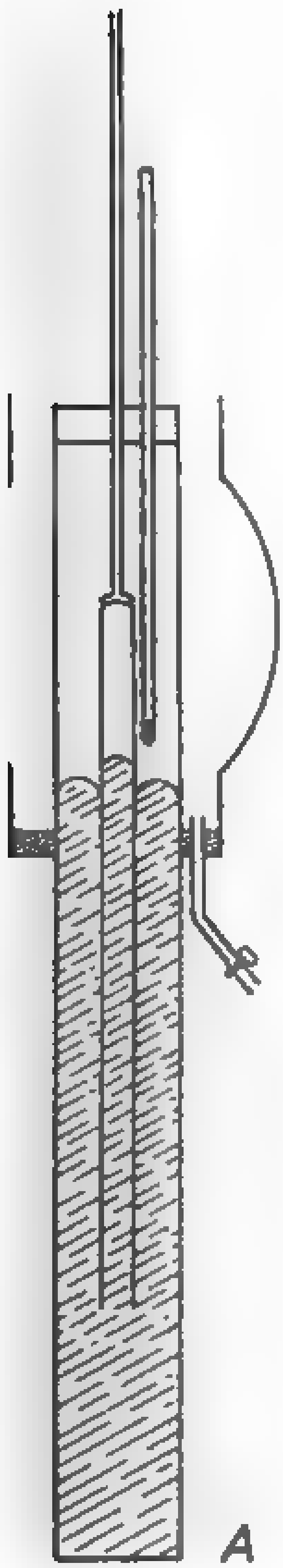

Fig. 1.

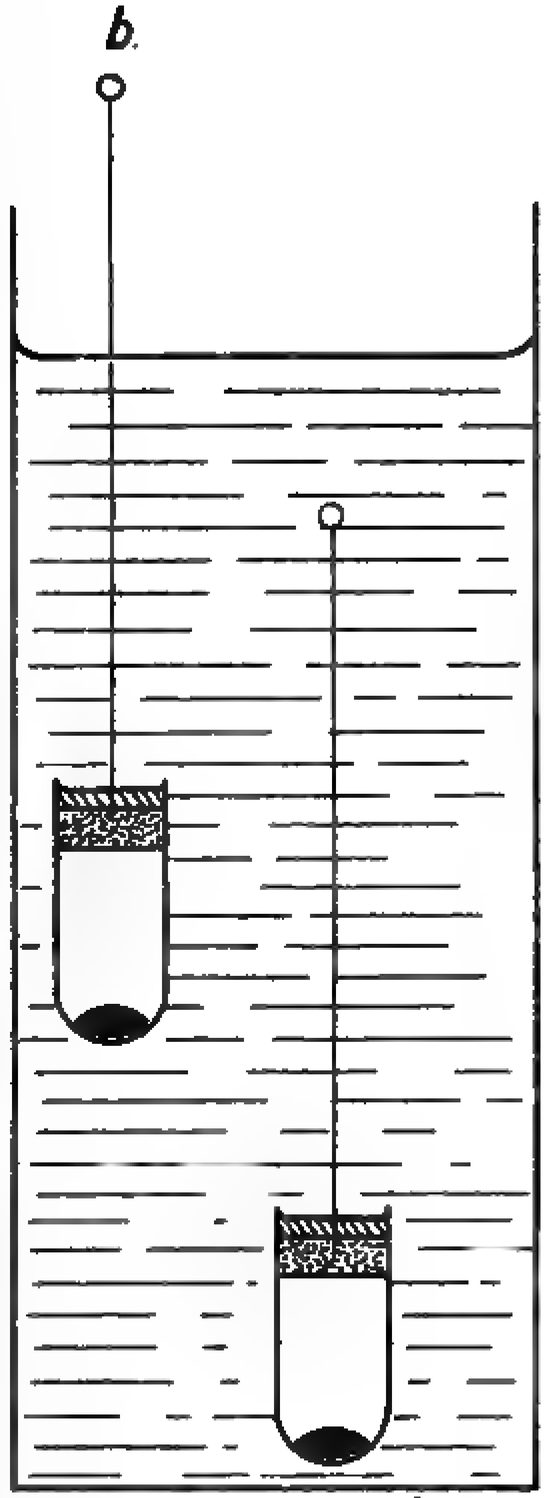

Fig. 2.

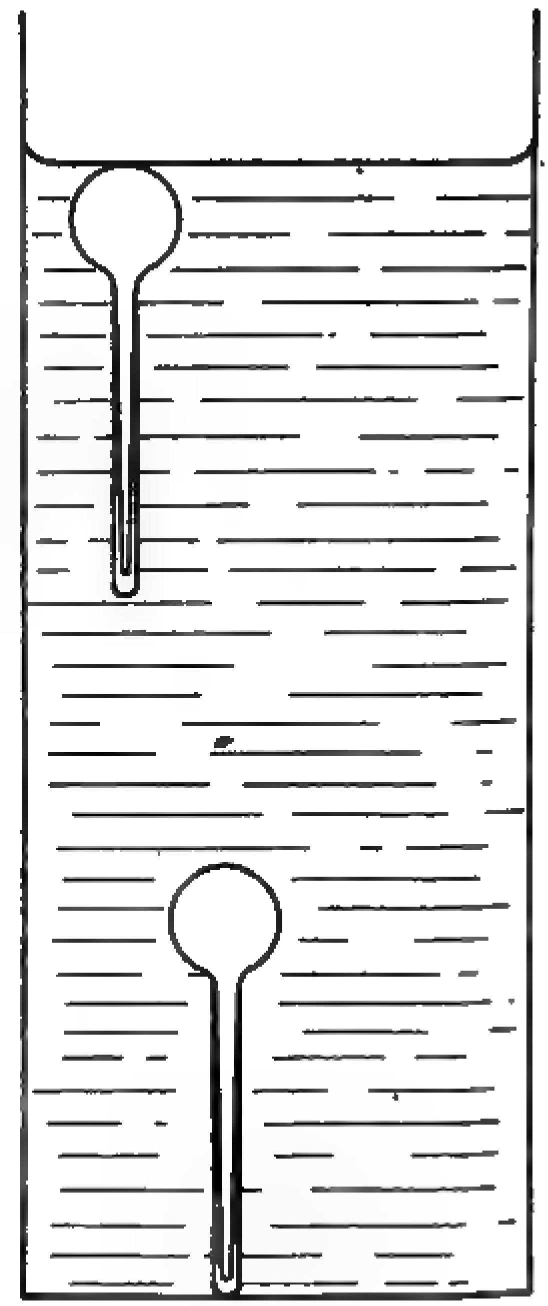

Fig. 3.

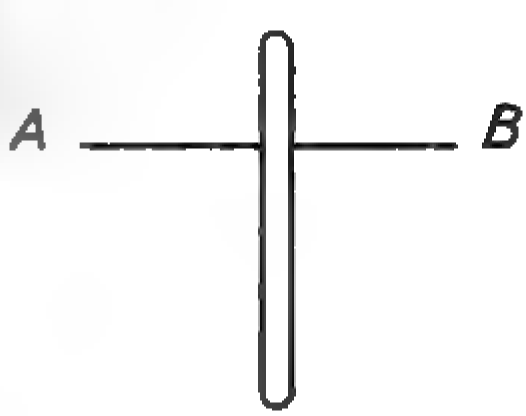

Fig 4.

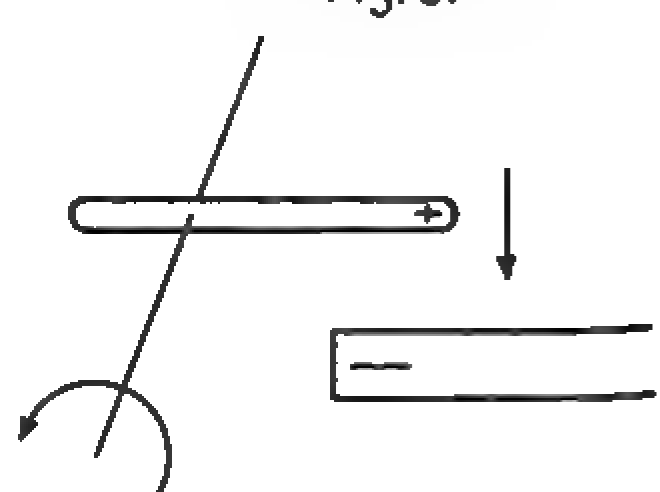

Fig. 5.

variety of forms, the very ingenious and simple device employed in the usual experiment for demonstrating Boyle's law is used. A tube 100 cm long and about 5 cm in diameter is closed at the lower end and two thirds filled with mercury (fig. 1). A small tube, likewise closed at one end, and graduated in cubic centimeters from the bottom upward, is inverted in this mercury cistern as in the usual Mariotte apparatus. It is convenient to select for this purpose a tube the total contents of which are 100 cc. Such tubes already graduated may be purchased of any dealer in chemical apparatus. If the amount of air intrapped in the upper end of this inner tube be such that, when the tube is pushed down so that the hight of the inner column of mercury is at the level of mercury in the outer cistern its volume is 27.3 cc at zero, the apparatus becomes direct reading. To adjust the pressure of the inclosed gas to exactly one atmosphere, a rubber cork is fitted to the open mouth of the larger tube. Through a hole in this cork a tube slides with sufficient friction to hold it in position at whatever point it may be released. The lower end of this sliding tube is enlarged in the blowpipe flame into the form of a small inverted cup. Within the hollow of this little cup the top of the tube which floats in the mercury is placed. The floating tube will then stand vertically in the center of the cistern, and its hight can be adjusted with ease so that, whatever may be the temperature, the mercury columns inside and outside of the tube will coincide. I know of no more simple or satisfactory method of maintaining the inclosed gas at a constant pressure of one atmosphere. To bring the inclosed volume of air to the temperatures, 0°C. and 100°C., an ordinary lamp chimney of the largest size is mounted so as to surround the entire upper portion of the outer tube as shown in fig. 1. The space between this lamp chimney and the outer tube may then be filled with water and crushed ice or a jet of steam may be introduced to bring the inclosed parts to a higher temperature.

In using the apparatus for classroom or lecture demonstration it is well to start at the steam point. The apparatus having been previously set up and steam introduced for some little

time before the beginning of the hour, the inner tube will have already attained the proper temperature when attention is first called to the subject. The inner tube is raised so that all may see the mercury column above the level in the mercury in the outer cistern. It is then lowered by pushing down the sliding tube till the pressure is exactly one atmosphere, and the hight of the column is read on the graduated scale. The steam jet is now removed, and the space between the outer tube and the chimney is filled with ice water. The mercury column within the inverted tube will soon be seen to begin to rise above the outer level. The apparatus is left standing while other topics to be presented to the class are considered, and just before the end of the period, the final adjustment is undertaken. The diminution of volume due to fall of temperature having been pointed out, the sliding tube is then pushed down till the pressure is restored to normal, when the reading on the graduated scale is again made. For the purpose of drawing off the condensed steam and likewise the water from the bath, it is convenient to insert through the collar on which the glass chimney is mounted a small tube with stopcock, as shown in the figure. A siphon may, however be employed for this purpose. Another convenient addition to the apparatus is a thermometer inserted through a hole in the upper cork, by means of which one can ascertain when the change of temperature is completed. Successful working of this apparatus depends of course on the use of dry mercury and a perfectly dry inner tube. To secure the very best results, the graduated tube should be completely filled with mercury before inverting in the cistern and air-dried, by passing through strong sulfuric acid or through drying tubes with potassium oxid, or phosphorous pentoxid should be introduced by means of an inverted siphon. If these precautions be taken, the apparatus will serve very well for quantitative laboratory work on the coefficient of expansion of air, though of course it is not possible to make readings to the degree of exactitude that may be obtained with more refined apparatus.

2 Floats adjusted to show the phenomenon of the maximum density of water

The fact that water reaches its maximum density at 4°C. is of course touched on even in our most elementary courses of experimental physics, and various forms of apparatus have been suggested for the purpose of showing this phenomenon. The simplest of these consists of a float, like that suggested by Preston in his well-known work on the theory of heat[1], so adjusted that it will float in water at 4° and sink in water at zero. Such floats may be given various forms, one of which is shown in fig. 2(a). This consists of a short piece of light glass tubing, preferably the bottom of an ordinary test tube, to which a cork is fitted. This cork should be of such size that it can be pushed down into the tube by slight pressure. The first approximate adjustment is made by pouring mercury into the tube till it will float nearly submerged in water with the cork inserted. A long, thin stem consisting of a fiber of glass not more than one half millimeter in diameter is now inserted vertically through the center of the cork, and the tube is sealed by the application of a layer of cement (bicycle tire cement or ordinary sealing wax). On placing the float thus prepared in water at 10°, it will be found either too heavily or too lightly loaded. In the latter case farther adjustment is possible by pushing the cork more deeply into the tube, thus decreasing its displacement, till it will sink. The final adjustment, which consists in lightening the tube as far as is possible without actually enabling it to float, is performed by melting the tip of the glass fiber in a Bunsen flame and removing small portions of the melted glass. If too much is removed, a still smaller amount may be restored in a similar manner. If this float be adjusted so that it will sink very slowly in water at 10°, it will do the same at zero, because the density of water at these two temperatures is almost identical. It only remains to determine whether the adjustment is close enough to admit of its rising at the intermediate temperature of 4°. When we consider how small the

[1] Preston. Theory of heat, p. 177.

change of density is between these temperatures, a unit of volume of water at zero diminishing to .99988 at 4° and increasing again to 1.000125 at 10°, it would seem at first hopeless to attempt to make such an adjustment. A little practice will show however that by successive alternate additions to and curtailment of the length of the glass fiber, the float may be brought to fulfil these delicate requirements. It will stand at the bottom of a cylinder of ice cold water, will rise slowly as the temperature approaches 4°, and, if care be taken to see that it is not permanently retained at the surface by the action of the surface film, it will sink again before 10° has been reached.

Another plan, likewise easily carried out, consists in so adjusting this simple instrument that it will float with a portion of the slender stem projecting through the surface volume at 10°. (*See* fig. 2(b)) In this form the instrument becomes an extremely sensitive hydrometer of variable immersion, and its upward and downward movement between zero and 4° and between 4° and 10° will frequently amount to 2 or 3 cm. In this form the apparatus lends itself to the actual measurements of the change of density of the liquid.

To both of these forms the following objections may be urged: in the first place, they are exceedingly fragile and in the second place, one never feels sure that the closing of the tube by means of the cemented cork is complete. The slightest leakage or the soaking of water into the cork through a layer of cement would speedily destroy the delicate balance of the instrument. On this account a float entirely constructed of glass and containing no mercury is to be preferred. A piece of ordinary glass tubing, having a bore of about 2 mm. is sealed at one end and is blown into a bulb about 6 or 8 mm in diameter. The tube is then drawn out in the flame of the blast-lamp at a point about 5 cm from the bulb and sealed off (fig 3). This closed tube is now placed in water at 10°. If it floats, more glass is added at the closed end till it sinks, and successive adjustments are made by adding to or subtracting from the amount of glass at the heavy end till it sinks very slowly indeed at that tempera-

ture. In order to save time, it is best to make two of these floats, adjusting the one in the flame while the other is cooling. It is not a long nor particularly difficult operation to adjust such floats, and they have the advantage of being permanent. After adjustment they may be placed in a bottle and will serve for a lifetime. For the purpose of demonstration it is only necessary to place the bottle in a bath of crushed ice or melting snow long enough to bring the contents into the neighborhood of the ice point, and then to place the bottle on the lecture table and allow it to warm up gradually in the atmosphere of the classroom. The bulbs, which at the beginning of the experiment are at the bottom of the bottle, will then rise and, after the liquid has passed the temperature of 4°, will sink slowly again to their original position.

3 Torsion balance electrometer

The gold leaf electroscope is an instrument of such simple construction and of such delicacy that it answers the purpose of indicating the presence of static charges of electricity and likewise of determining their sign, in an admirable manner. There is however nothing quantitative about the action of such electroscopes in the ordinary form; and, when we come to the question of measuring differences of electrical potential, the usual forms of electrometer are somewhat expensive to construct and difficult to handle. In the instrument now to be described I have endeavored to apply a principle already used by Threlfall for the measurement of the force of gravitation. Consider the case of a short rod mounted with freedom of rotation about the horizontal axis AB (fig. 4). Its position of unstable equilibrium will be that in which the longer end of the rod is vertically above the axis of support. If now such a rod be fastened, at the point where the axis in the figure lies, to a horizontal fiber of quartz or to a fine wire, one end of which is fixed while the other is capable of being twisted by means of a micrometer screw, the twisting of the fiber will gradually lift the suspended bar with a motion of rotation out of its vertical position of stable equilib-

rium. The position of unstable equilibrium will no longer be vertical, but will make some angle with the vertical plane, depending on the stiffness of the fiber and the mass and adjustment of the rod. Finally, as the torc increases, the angle of instability is reached and the equilibrium of the rod is converted from the stable to the unstable type. At the position at which this change is approached the sensibility of the rod to forces tending to turn it on its axis, increases indefinitely; so that by means of this device a torsion balance may be constructed, the sensitiveness of which, like that of the ordinary balance, may be increased at will up to the point where it is no longer possible to make it return to its zero position. By a suitable adjustment of the bar this position of maximum sensibility may be made to occur when the bar is in a horizontal plane (fig. 5), and, if the longer end of the bar be given a metallic coating and be charged, we have an instrument which may be used as an electroscope. By attaching to the short end of the bar a mirror so that its angular movement can be carefully observed and by using the micrometer screw at the torsion head to bring the bar back to its zero position, the instrument becomes an electrometer. The degree of sensitiveness to which an instrument of this type can be brought may be readily imagined. Threlfall found that, with the form which he gave to it, he could measure variations in the force of gravitation which did not amount to more than one part in a million. I am experimenting at present to see whether it be not possible to construct a manageable balance of this kind which will show the gravitational traction of bodies for one another. An apparatus which will do this and which is easily handled in the classroom would be of course a desirable addition to our equipments for demonstration. The principal fault which torsion balances of this type possess consists in the lack of sufficient damping. Whenever they are drawn out of the position of equilibrium, they oscillate for a considerable time before coming to rest. Even if we are not able to overcome this fault, such balances will be useful in many ways. With them we may exhibit and compare magnetic attractions and repulsions by substituting for the

charged body at the end of the rod a thin disk of iron. By placing vertically beneath this disk a coil of wire, one may readily convert the apparatus into a sensitive ammeter.

In seeking to increase our means in illustrating the principles of physics, it is often better to endeavor to find new applications of existing apparatus with such modifications as may be necessary than to attempt to devise something entirely novel. This is the method of procedure which I have followed in the present paper, and the examples might be indefinitely extended. Take for instance, the revolving mirror devised by König for the study of the manometric flame. This may be used in a large number of other striking experiments, by means of which the complex character of the electric spark may be shown, curves obtained from the composition of two vibrations either parallel or making any desired angle with one another may be exhibited. The periodic extinction of the alternating arc or the movements of such an arc in the magnetic field may be studied, etc. With another well-known and very simple instrument, the revolving disk with open sectors, innumerable fleeting phenomena may be exhibited. Prof. Boys for example used this device for showing the nature of the action of sound waves on sensitive water jets. It is equally applicable to the observation of the changes of form of falling drops, the study of vibrating rods and strings or the mapping of the paths of projectiles. In all such work the aim should be to secure the greatest simplicity of construction compatible with the satisfactory operation of the instrument.

Section B. BIOLOGY

TEACHING PHYSIOLOGY IN SECONDARY SCHOOLS

BY PROF. FREDERIC S. LEE, COLUMBIA UNIVERSITY

It is a pleasure and privilege to meet the members of this association. I am sure that you have much valuable knowledge to impart regarding the teaching of physiology in secondary schools, and I have come to be instructed; to receive rather than to give. I shall make certain suggestions, but shall hope that you will make more, and that at the end of our discussion I shall feel a

much greater familiarity with my subject than I now feel. I sometimes think that, of all teachers, we who teach physiology, whether in the colleges or in the secondary schools, are a very good-natured folk and most courageous, for we are opposed in so many, so diverse, and so unique ways. The cruelty of the anti-dissectionists and the anti-vivisectionists is notorious. They abuse us for what we do, and they would force us to teach the science of life without recourse to the things of life. The anti-alcoholics and the anti-tobacconists say that we drink and smoke, and they would compel us to subordinate all our instruction to the demands of an intemperate temperance. The parents, forgetting that man is divinely made, say that whatever is inside his body is unclean, and a knowledge of it is improper, and they do not wish the minds of their sons and daughters to be corrupted. Against all these we must contend; and happy is he who can retain the sweetness of his spirit and the sanity of his teaching. Yet, in spite of all these, the character of instruction in physiology in both the secondary schools and the colleges has steadily improved, more slowly perhaps than in other sciences, but still it has steadily improved, till it now approximates that of chemistry and physics and zoology and botany. We are now in the midst of a specially rapid part of our progress, and it seems to me well to be sure that we know our compass points and direct our course rather than drift with chance currents. Hence I wish to talk over with you today what our course should be and how we can best direct it. Let us consider, in the first place, the question of what we shall teach.

I have long felt that we have been looking at our science from too narrow a standpoint, and that this is in great part responsible for the slow betterment of our teaching methods. We have confined ourselves to the physiology of the human body, forgetful of the fact that, wherever living substance exists, there is physiology. To me physiology is the science of the living process, the science of life itself, of vital activity, not passivity, of vital dynamics, not statics. It deals with living matter, not with dead or non-living matter. It is altogether secondary whether the life

and the living matter occur in a man or a monkey, a vertebrate or an invertebrate, an exogen or an endogen. If the life is there, there is physiology. Is it not a fact that few teachers impress this view on their pupils? The latter learn, as one pupil expressed it to me, that "physiology is all about your bones and stomach and liver and heart," that is, the word, physiology, suggests the human body only. In the textbooks we constantly find in use the term, "the body", as if there existed no other body than that of man. This use of the word, body, always suggests to me a limited recognition of the scope of our science. It is true that the science developed historically as a science of the human body, and the anthropocentric idea has prevailed among biologists till very recent times. But, thanks to the discovery of protoplasm as the physical basis of life, the formulation and promulgation of the evolution theory, the consequent idea of the essential unity of life, and the resulting wonderful advance of biology in general, the fact is now evident to biologists that physiology is a science that should far transcend its former human boundaries and be synonymous with the science of the vital process itself. The word, physiology, should be associated with the body of man no more than with that of other organisms, animal or plant. There is a physiology of the frog, of the earthworm, of the amoeba, of the mold and the flowering plant, as there is a physiology of man. This is clearly recognized in the admirable book, *Practical biology* written by the president of this association, Prof. Dodge. It may be said that all this is very true, but why attempt to cover so wide a field in teaching the subject in secondary schools? My reply would be, because I believe that with most pupils the broader conception is far the more interesting one, that it obviates the feeling of repugnance with which not a few pupils approach the study of physiology, and it tends to prevent the development of a feeling of self-consciousness, for which the contemplation of the human body alone may be responsible. I think that the last-mentioned point indicates a real danger, which has not been sufficiently considered by teachers. Whenever there preexists a tendency toward the consciousness

of self, the concentration of one's thoughts on the phenomena of one's own body can be only detrimental, and a pronounced self-consciousness is one of the greatest handicaps in the struggle of life. The broader conception of the scope of physiology would make the pupil regard his own body not as unique, but as one of many.

Furthermore, the words of the pupil already quoted give a clue to another false conception on the part of most pupils and, I fear, many teachers. "Physiology is all about your bones, and stomach and liver and heart," that is, all about the organs of the body. Now we all know that the organ is but one kind of bodily component, but one unit in the successive stages of analysis of the structural composition of a body. There is the body or organism; this is composed of organs; the organ is composed of tissues, and the tissue of cells. There are thus four structural units of different grades. We are prone not to recognize the fact that each unit has its physiology. All that the organism as a whole does constitutes the physiology of the organism; all that each organ as a whole does constitutes the physiology of the organ; and so with each tissue and each cell. The one thing that is the basis of all these is the living substance, protoplasm, and it is the vital process of protoplasm which is the basis of physiology. I think this last fact can not be too strongly insisted on. We do not sufficiently impress it on and into the minds of our pupils that there is a living substance, something distinct from non-living substance; that this permeates and is the essential part of all organs, tissues and cells of all organisms; and that all vital phenomena are simply the expression of the living of this living substance. I am quite aware of the fact that the boundaries between the living and the non-living are not sharply drawn; and, if I were asked to give an exact definition of living substance as distinguished from non-living substance, I would be forced to confess my inability to do so. But this need not obscure the facts that in the minds of all biologists the two conceptions of the living and the non-living are justly separate, and that each represents a distinct entity.

I have spoken of the physiology of organisms, and it may be well to dwell for a moment on this point. By this term I mean to include all the activities of the individual considered as a whole, in distinction from the activities of the parts of the individual. It signifies, in other words, the relations of the individual to his environment, and it constitutes what may be termed external physiology, in distinction from the internal physiology of the organs, tissues and cells. 30 years ago Haeckel made a similar division of the subject-matter of the science, employing the terms, "the physiology of relation," and "the physiology of conservation." External physiology would include much that was formerly included under the term, "natural history", such as mode of life, habits and instincts, life histories, the many and varied relations of individual to individual, and of animal to plant, the events of daily and seasonal life, and a host of allied phenomena. External physiology would thus include much that is now comprehended under the term, "nature study", and it is an interesting fact that this modern term, "nature study", is an almost literal translation of the word, physiology (Greek Φύσις and λόγος)." A very early, if not the original sense of the word, Φύσις, and the sense in which it is at times used in the Homeric poems, is that of living nature; and it is the living of nature to which we should go back in our conception of the science. It is a practical impossibility to draw a sharp line between internal and external physiology, for there is hardly a single vital activity within the organism that is not plainly dependent on the relation of the organism to its environment.

The second point that I would make is the desirability of distinguishing carefully between anatomy, or morphology, and physiology, and making the pupil understand and appreciate this distinction. The average course which goes by the name, "physiology," is a hodge-podge of anatomy, histology, physiology and hygiene, and the pupil rarely understands the distinctions between these various sciences. These distinctions should be clearly appreciated; and I am glad to say that they are made sharp and clear in the *Elementary biology* of Prof. Dodge, to

which I have had occasion to refer. Moreover, and what is of more value, the idea of physiology proper should be kept paramount, and anatomy and histology should be introduced only in so far as they illuminate the former. To me an anatomic fact in itself is of little importance. It becomes of immediate interest, however, if it be correlated with the idea of function, and I think it not improbable that this is the experience of most individuals. This leads me to recall to your mind what Huxley has said of his own scientific bent. I quote from the very charming *Life and letters*, which has recently been published by his son. Referring to his early medical studies, he says: "The only part of my professional course which really and deeply interested me was physiology, which is the mechanical engineering of living machines; and, notwithstanding that natural science has been my proper business, I am afraid there is very little of the genuine naturalist in me. I never collected anything, and species work was always a burden to me; what I cared for was the architectural and engineering part of the business, the working out the wonderful unity of plan in the thousands and thousands of diverse living constructions, and the modifications of similar apparatuses to serve diverse ends." This curiosity regarding the work of living machines is widespread, yet most elementary textbooks of physiology are burdened with needless anatomic and histologic details, and too often these burdens are transferred to the pupil to lumber his mind. This is specially conspicuous in the study of the brain. Here, where knowledge of function is sadly lacking, its place is taken by innumerable and intricate details of structure, the significance of which neither the teacher nor the pupil understands, and which the latter must commit to memory, as the former did before him, merely as isolated brute facts. If physiology were merely a memory science, such criticism would be uncalled for. But it is not a mere memory science. It is a science not of observation only, but preeminently of experiment; and, because of this fact, above all other biologic sciences it develops the reasoning powers. Where there are such splendid opportunities of study-

ing the relations of cause and effect, we as teachers are not using our highest privileges if we neglect these opportunities, and confine our efforts to the cramming of the pupils' minds with undigested, unreasoned and unappreciated anatomic facts.

In thus urging the maintenance of a distinction between anatomy and physiology and the use of the former only as an aid to the latter—a subject to which I shall have occasion to refer again—I have introduced a third point in the matter of what we shall teach, and that is, that in the selection of subjects to be taught we ought to be governed by a proper sense of proportion. The customary selection, as made by the writers of the textbooks, is not altogether a good one. As has been already intimated, the textbooks confine themselves too closely to internal physiology, and contain needless anatomic detail. Furthermore, it has become the habit among the textbook-makers to magnify out of all proportion to their value certain matters which are not simply anatomic. Take, for example, the fact that is usually made so prominent, that bones contain animal and mineral matter in certain proportions. I venture to assert that as usually taught this is a mere matter of memory for the pupil, the real significance of which he does not at all appreciate, and this is so even if he sees the decalcified fibula tied up in a knot. The terms, animal and mineral, are Greek to the pupil. If he could be made to know that a bone is composed of living substance and non-living substance, arranged in certain definite ways, that it subserves its chief function as an organ of support or protection by reason of the superabundance of its non-living substance, and that its living substance, relatively minute in quantity, is present for nutrition and growth and repair, he would appreciate the value of an understanding of the composition of bony tissue. Take again the facts of blood pressure: even in elementary textbooks these are often stated at length, while the significance of the facts in regulating the supply of blood to the various parts of the body is altogether subordinated or lost sight of. In many of the larger textbooks the details of blood coagulation are rehearsed

at a length out of all proportion to their value as elucidating physiologic processes. In these various cases it happens too often also that the pupil is lost in a maze of detail, and fails to see the principles that should be brought out; he can not see the wood for the trees. For my part, I would bring all subjects, such as those mentioned, the anatomy of the brain, blood pressure, the coagulation of blood—and the list might be greatly enlarged—down to their lowest level of detail, and this level should be that which is necessary to a comprehension of the functional uses of the parts or phenomena in question.

So much for the question of what we shall teach. Now how shall we teach it? First, whatever is taught and whatever methods are used in the teaching of it, it should be taught as a science still in the process of making. The sum of physiologic knowledge is being increased every day. I speak of this point with special feeling because it was my unfortunate experience in my introduction to the study to be taught differently. I was first taught physiology as I might have been taught, as I was taught, Latin and Greek—as something that is completed, dead. The idea was never given to me that there existed at that day working physiologists, and busy physiological laboratories, where men were constantly pushing out into the unknown, discovering new facts, overturning old theories and advancing new ones, that there existed numerous journals devoted to the publication of the results of original researches in physiology alone, and that the progress of the science was so rapid that it was quite impossible for one to keep pace with it in all its features. If physiology is the science of the living, it should be taught as a living science. In my experience there is no way in which a student's interest in a subject may be more effectively aroused than by making him realize that the subject is still in an uncompleted state, that discoveries are still to be made in it, and that some of these discoveries are just as possible for him as for any one else. Most elementary textbooks err in this respect, that they are not willing to say that anything is unknown, and it not rarely happens that teachers, from

a false sense of pride, attempt to assume a knowledge where knowledge is not. We all know how fatal in the long run is this attitude. Prof. Pearson has well said: "We must accomplish a task more difficult to many minds than daring to know. We must dare to be ignorant." There is much more that our science has yet to acquire than it now possesses. Let us be at least as modest as our science.

Now more specifically as to the method that we should use. Here is to be found the most marked evidence of the progress in physiologic instruction of which I have spoken. Strange as it may seem, only comparatively recently has physiology been recognized in its methods of instruction as one of the natural sciences. The textbook has been too long the one source of knowledge. But now the teachers have become enlightened, and practical physiology has come to stay, even in secondary schools. In all divisions of our subject either practical work on the part of the pupil, or demonstration by the teacher, is now a necessity. The days when the only object lessons that the pupil received were those that could be learned from the human skeleton borrowed from the village doctor are happily passed. Practical physiology has emerged from that stage of ossification. And it is now becoming, what it should have become long ago, a matter of things and not words. There is no stronger evidence of the reality of the practical phase of physiologic instruction than the fact that, while 10 years ago good directions for the practical teaching of physiology did not exist in print, now almost every elementary textbook contains directions for laboratory work either for the teacher or for the pupil, and not a few special books in practical physiology are appearing. The elementary textbooks with directions for practical work are innumerable and need not be severally mentioned here. Of the specially practical books those of Mr Peabody of the Peter Cooper high school, New York city, and of Miss Brown of the state normal school, Hyannis (Mass.), are both excellent. They cover the customary elementary ground with a fair degree of fullness, and they have the great merit of requiring the pupil to

"study nature, not books," as the elder Agassiz so epigrammatically put it. Strange as it may seem, it is not every laboratory handbook that follows this wise injunction. While professing to guide the student in his study of nature, too many contain and impart the information which nature lying on the laboratory table waits to give. The student learns from the book, and looks at the specimens to see whether nature has learned her lesson and has actually produced what the book says she should have produced. Lamentable as this mode of teaching is, happily it is rapidly being replaced in physiology, as in the other natural sciences, by the more rational method of directing the student's attention by skilful questions to the object before him and making him learn from nature herself the laws of nature. The ideal method then is for the student himself to do the practical work and obtain the mass of his knowledge by its aid, and poor indeed is the school in which this can not be done to a considerable extent. Such poor schools do exist, but in the majority of cases their poverty consists mainly in the lack of energy on the part of the teacher. Whatever the cause, it does sometimes happen, however, that practical work by the pupil is an impossibility. In such case, recourse should be had to careful demonstrations and demonstrative talks by the teacher, and these can be made of very great value, either as the sole object method of instructing or as an adjunct in the study of complicated phenomena, where the simpler ones are dealt with by the pupil himself.

In thus advocating the wide use of the object method, I would not be understood as decrying the textbook. Prof. Minot has said: "The practical work is the instructive work; it is the source of real knowledge. The actual direct contact with the objects and with the phenomena *is* knowledge." And then he adds with humorous exaggeration: "Knowledge lives in the laboratory; when it is dead we bury it, decently, in a book". In considering how literally these words are to be taken, it might be well to bear in mind that in his great work on human embryology, Prof. Minot has himself given to the world one

of the finest specimens of dead knowledge that exists in modern scientific literature. Notwithstanding the preeminent value of the practical work, the textbook has justly a very real place in elementary scientific instruction, if for no other reason than that it serves as a convenient compendium of what may be learned from the object, and enables the pupil to fill in the gaps that, with the best laboratory instruction, are necessarily left in his knowledge of the subject. In all cases, however, the pupil should be made to feel that the book is secondary; that nature, not the book, is the thing to be learned.

In applying these general ideas now to the case before us, the teaching of physiology, I wish to emphasize again the fact that anatomy and physiology are two separate and distinct sciences. A knowledge of anatomy is a prerequisite to a knowledge of physiology, but it can never be made a substitute for the latter. Function can not be inferred with accuracy from structure. The truth of this is abundantly evident in the long history of physiology, and no concrete example is more striking than that of the discovery of the circulation of the blood. To us the facts of the circulation are so familiar and appear so obvious that, at first thought, it is difficult to realize that they needed any discovery at all, much less that such discovery extended over some two thousand years. Physiologic observations on the living organism were comparatively few before the Christian era, and up to this time all ideas of the functions of the heart and the blood vessels, which were derived mainly from dissection and the observation of conditions in dead animals, were crude and fantastic. According to Aristotle the heart is "the source and fountain of the blood, and its prime receptacle;" it is "the seat of vitality, in which the blood receives its final elaboration and its impregnation with animal heat." The blood is concocted continually in the heart and passes thence continually along the blood vessels to the periphery (no difference in function being recognized between arteries and veins) and at the periphery it is disseminated by exudation throughout the substance of the body, there supplying nutriment, and being continually consumed, but never

not take place simultaneously, and the teacher may make use of this fact to great advantage. A large range of physiologic facts may be demonstrated by the use of the surviving organs and tissues of the invertebrates and the cold-blooded vertebrates. I have found a turtle's heart to beat for three weeks after the death of the animal. The possibilities in the use of the frog's heart are well known; so also the frog's voluntary muscles, the frog's spinal cord, ciliary action in the frog's esophagus and in the gills of the clam; and a host of other illustrations might be mentioned. But in our zeal to teach physiology practically we must not fall into the error of thinking that only by cutting up things can this be done. For this method will after all give us only a partial view of a science whose domains are as broad as those of life itself, and, moreover, there is danger that it may develop in the minds of the more sensitive pupils a repugnance to a subject which ought not to be repugnant. Of inestimable value is the too often forgotten method of studying the living, uninjured being, either man himself or a lower organism. How much can be learned in this way in the study of one's own body is well shown by Mr Peabody in his *Laboratory exercises*, and how much in the study of uninjured lower animals and plants by Dodge in his *Practical biology*, to both of which excellent books I have already referred. I have always found it most interesting to students and most instructive, to have always at hand in my laboratory, living in a natural state, animals and plants, either terrestrial or aquatic, or both, to serve as constant demonstrations of the physiology of organisms. Aquariums and vivariums should never be absent from a place where physiology is taught. Furthermore, the use of models is to be encouraged, both the excellent anatomic models of organs which are now so readily obtainable, and specially the numerous models which can readily be made by the teacher or the pupil for the illustration of a considerable variety of organic functions. Thus, with all the possibilities before him in the use of uninjured organisms, the surviving parts of organisms, dead organisms, and anatomic or working models, and with the numerous books now in existence which

give directions for the realization of these possibilities, the teacher of physiology at the present day has little excuse for not illustrating his subject in a way both instructive and attractive. It is my hope that at some future day we may be able to offer at Columbia a special course of instruction on the methods of teaching physiology.

I have referred to the repugnance which the more sensitive pupils, particularly girls, often feel toward the exhibition of anatomic material, of dissected animals or organs, and even toward the thought of picturing the processes taking place within their own bodies. Not even the teachers are free from this aversion. This feeling manifests itself in various forms. Sometimes it is merely the fancy that dead things are unclean. Sometimes it is a causeless shrinking from what has once lived and is now dead, the unreasoning shrinking from a corpse, and this shrinking may amount to an actual physical impossibility to handle or even closely to observe dissected parts. Sometimes it is an impression that a knowledge of one's own bodily processes is gross, improper, and immodest knowledge. My colleague, Dr Curtis, has suggested with no little degree of probability that this last phase of the mental phenomenon in question is the remnant of the old religious feeling of the middle ages, that the body is altogether vile in comparison with the soul, and that it should be scourged and debased and crucified. May the 20th century see the final casting out from the human mind of this remnant of a doctrine so unworthy of it! However manifested, this feeling is often real and deep-seated, and every teacher recognizes it as a serious obstacle in his work. It appears specially serious when we realize that often it is developed early in the child's mind by ill directed, or by the lack of well directed, home training. How much easier the work of the teacher would be if all parents were exterminated! Whatever its origin and however unfortunate it may be, the feeling of which I speak must not be either rudely ridiculed or grossly crushed. In the great majority of cases it can be alleviated, if not entirely cured, but experience has shown that there is no universal means of alleviation or cure. One en-

thusiastic teacher has told me of successfully combating a particularly aggravated case of this kind and thoroughly arousing the pupil's interest by making her realize that she was studying "the story of herself". She seemed never to have realized that she herself could have a story. The awakening of the girl's vanity was perhaps in this instance pardonable. But, notwithstanding the success of this teacher's effort, I can not but believe that in most cases the feeling of aversion would be less prominent if the opposite course were pursued, if the broad view of the scope of physiology were taken, which I have accented. Do not allow the pupil to get the idea, or if preformed, combat it, that physiology is "all about your bones and stomach and liver and heart". Make the study something more than a brooding over what goes on in the inside of the pupil's body, make it include the outside and all that the human body does. Make it comparative, make it a study of the living process, wherever and however manifested. The thought of physiology ought to convey with it thoughts of the beauties of life rather than repulsive pictures of death and mutilation. In dealing with this feeling the personal contact of the teacher with the pupil is of all importance, and each case should be dealt with as its own peculiarities suggest.

A word now as to the nature of the school course in physiology as modified by the age and previous preparation of the pupil. The idea is widely held that, since physiology is in substance the physics and chemistry of living matter, it should be preceded in the school course by physics and chemistry proper, and thus be relegated to a late position in the pupil's career. Some extremists would even remove it altogether from the secondary schools and confine it to the colleges. With this extreme position I can not agree; but within the high school or academy the scientific courses should be so arranged that physiology follows physics and chemistry. It should there be taught primarily as a pure science, but with its hygienic applications not neglected. Taught in this way and with abundant laboratory work, it would constitute, I believe, the very best and broad-

est discipline that the natural sciences are capable of giving the high school student. But the physico-chemical nature of the subject-matter of physiology need not, it seems to me, inevitably relegate the science to the latter part of the school course and to the older pupils. In fact, our wise legislators at Albany have decreed that the minds of the youth of New York are quite capable of appreciating the science at a very early period; hence in the public schools of the state its study is begun at an early age. Here is the critical period; the future of the science in the mind of the individual pupil is decided by the nature of the instruction that he receives at this time. If it be broad, general and biologic, the chances are great that he will be attracted; if it be made, as is too often the case, narrow, special and anthropocentric—and, I might add, alchoholic—the chances are that he will be repelled. A broad, general and biologic conception, in which the physiology of organisms—nature study, if you will—plays a prominent part, is quite in harmony with the introduction of hygiene, and the latter should in my opinion be made relatively prominent in this junior instruction. But beware of forcing the child into the state of a little friend of mine, who very wearily told me that, "Physiology is just 'don't drink, don't smoke, don't drink, don't smoke'".

Now a few words regarding the problem of alchohol—not because there is any innate relation between alcohol and physiology, but because our lawmakers, the country over, have declared that a relation between the two shall exist in the schools. I recognize to the full extent the tremendous evils of the drink habit. I realize how serious is the problem of its control; and I would welcome any method that would successfully combat that habit. But, when I meet among the teachers the widespread feeling that the law regarding the so-called temperance instruction is a mistake, and their great disinclination to uphold the law literally, and when I hear the children right and left ridiculing the lurid lessons that are reiterated year after year by the textbooks regarding the evil effects of alchoholic

drinks, I can not help feeling that the fanatics who have brought about such a state of things are doing a serious harm to the cause of real temperance among American youth. Pope had a correct understanding of human nature when he wrote:

> Vice is a monster of so frightful mien,
> As, to be hated, needs but to be seen;
> Yet seen too oft, familiar with her face,
> We first endure, then pity, then embrace.

The cause of righteousness was never promoted by misrepresentation or by making virtue nauseating. If the textbooks would tell the plain truth about the alcohol problem, there would be less cause for complaint, but it is notorious that they do not do so. And the belief is widespread and apparently well founded that a book containing the plain truth would have little if any chance of adoption by the school boards. Such a state of affairs is most lamentable; and I trust that the teachers themselves will not hesitate to speak their minds freely and endeavor in the interests of truth and genuine temperance to bring about a reform of the existing intemperate law.

But what now is the plain truth about the alcohol problem? I shall not attempt in this brief paper to review the whole subject, but the leading question is this: Is alcohol a food? In the summer of 1898 I had the privilege of taking part in the deliberations of the fourth International physiological congress in Cambridge (Eng.). The meetings brought together in the fascinating old university town a large and representative body of the world's physiologists, from the various European countries and Great Britain, from Asia, from Japan, and from America. The following statement prepared by Prof. Michael Foster, the most prominent of the British physiologists, was subscribed to by a considerable proportion of the members of the congress. It is stated by Prof. Atwater, who received these signatures, that "nearly all are well-known investigators. Among them are professors, teachers, and heads of laboratories of a large number of the most noted universities and medical schools of the world. The list includes many of the most celebrated physiologists of our time". The statement is as follows:

The physiological effects of alcohol, taken in a diluted form, in small doses, as indicated by the popular phrase, "moderate use of alcohol," in spite of the continued study of past years, have not as yet been clearly and completely made out. Very much remains to be done, but thus far the results of careful experiments show that alcohol, so taken, is oxidized within the body, and so supplies energy like common articles of food, and that it is physiologically incorrect to designate it as a poison, that is, a substance which can only do harm and never good to the body. Briefly, none of the exact results hitherto gained can be appealed to as contradicting, from a purely physiological point of view, the conclusion which some persons have drawn from their daily common experience that alcohol so used may be beneficial to their health.

The value of this simple, quiet statement by men who are familiar with the trend of scientific progress and are directing the physiologic investigations of the world, men for whom truth is the constant goal of endeavor, can not fail to be recognized. The statement, it will be observed, is not simply a statement of opinion, but a summary of "the results of careful experiments." Since this statement was formulated, an American physiologic chemist, Prof. Atwater, of Wesleyan university, has conducted some of the most careful experimental researches that have yet been performed and has arrived at results which demonstrate, even more clearly than had been done before, the truth of Sir Michael Foster's words. Doubtless you are acquainted with the method of experimenting followed by Prof. Atwater. For his purpose the human body is a machine for the transformation of the energy of its food into heat and mechanical work, and it is comparable to a non-living machine, say a steam engine. Whatever energy goes out from the steam engine in the form of heat and work can readily be computed, and is equivalent to the energy that comes into the engine in the coal. The latter can also readily be computed, since it is nothing but the heat liberated in the complete combustion of the coal. So too with the living human engine, whatever goes out in the form of heat and work can readily be measured, and is found to be practically equivalent to the energy liberated as

heat when the man's food is completely burned. The subject of Prof. Atwater's experiment, an adult man, is locked into an air-tight chamber, which is provided with walls of metal and glass, and is large enough to enable him to stand, sit, and lie at full length. The chamber is provided with ingoing and outgoing pipes for the passage of air, with doors for the introduction of food, with a bed, a table and a chair, with a stationary bicycle for doing work, and with a telephone for communicating with the outside world. Here the man lives for days, carefully watched by the scientific attendants. The most exact determinations are made of the chemical composition of the food and of the excreta, and of the amounts of energy taken in and given out. The effects of different kinds of food have been studied, and alcohol has been given a rigid test. In the alcohol experiments a known quantity of pure ethyl alcohol or whiskey or brandy is administered in place of a portion of the sugar, starch and fat of the food which contains an equivalent amount of potential energy. Prof. Atwater states his results briefly as follows:

First, extremely little of the alcohol was given off from the body unconsumed; indeed, it was oxidized, i. e. burned, as completely as bread, meat, or any other food. Second, in the oxidation, all of the potential energy of the alcohol was transformed into heat or muscular power. In other words, the body transformed the energy of the alcohol as it did that of sugar, starch, and other ordinary food materials. Third, taking the experiments together, the body held its own just as well with the rations consisting partly of alcohol as it did with the others. . . In other words . . . the alcohol protected the nitrogen and carbon, the proteids and fats of the body from consumption as effectively as the carbonaceous nutrients which it replaced.

In view of these very careful experiments and their exact results, it seems to me that only an affirmative answer can be given to the question, "Is alcohol a food?" But Prof. Atwater finds that it is a food in small quantities only and in the sense of yielding energy to the body, but not of building tissue.

In yielding energy to the body it resembles sugar, starch and fat, though just how and to what extent it resembles them experimental inquiry has not yet told us. It differs from them in that it does not require digestion, and is hence believed to be more easily and immediately available to the body. It is not stored in the body for future use, like the nutrients of ordinary food materials. The quantity that may be advantageously used is small. If large amounts are taken, its influence upon the nerves and brain are such as to counteract its nutritive effect, and it becomes injurious in various ways.

(Whoever is specially interested in Prof. Atwater's work will find résumés by himself in the *Educational review* for June 1900, and in *Harper's magazine* for October and November of the same year.)

There are few things on this earth that are altogether vile. The world owes many blessings to the saving graces of alcohol; and I can not bring myself to believe that the fact that the Creator of all things has made the human body capable of obtaining energy from this much reviled chemical compound, will prove a serious obstacle to the propagation of a genuine temperance.

I can not draw my paper to a close without referring, very briefly to a general matter which interests all teachers of physiology in whatever academic grade—that is, the value of a training in our science as a general factor in education. The value of scientific training in general is so universally admitted that it is not necessary to analyze or demonstrate this, but the value of a special training in physiology is rarely recognized as it should be. In the classification of the natural sciences the physical sciences are often set apart, as exact sciences or sciences of precision, from the biologic sciences, which are termed descriptive; and the mental training afforded by the components of the one group is different in kind from that afforded by the components of the other. Physiology is unique in being at the same time in its subject-matter, its methods and its achievements both physical and biologic; a competent physiologist must be at once a physicist and a biologist; and, in

harmony with the composite character of the science, training in it combines the educational value of the exact with that of the descriptive sciences. If the scientific education of the boy or girl is to be limited to one science, by all means let it be physiology, but let the instruction be characterized by broad-mindedness, generosity and sympathy. Huxley has admirably said:

Leave out the physiological sciences from your curriculum, and you launch the student into the world, undisciplined in that science whose subject-matter would best develop his powers of observation; ignorant of facts of the deepest importance for his own and others' welfare; blind to the richest sources of beauty in God's creation; and unprovided with that belief in a living law, and an order manifesting itself in and through endless change and variety, which might serve to check and moderate that phase of despair through which, if he take an earnest interest in social problems, he will assuredly sooner or later pass.

In these closing days of the old century and opening days of the new, when a spirit of pessimistic discontent is widespread, and the "phase of despair" of which Huxley speaks is all too prevalent, the teacher has a great task to perform. To combat the prevalent tendency, to inculcate an inspiring and helpful optimism, to lead on to courage, high ideals and right living—this is what the study of life, properly directed, will do.

Prof. James H. Stoller—I regret that the time now remaining for the discussion of Prof. Lee's paper, which has given us so much pleasure, is very short. Might I ask Prof. Beal how long his paper is?

Prof. W. J. Beal—As long as you wish, Prof. Stoller.

Prof. Stoller—I suggest then, that we appropriate a few minutes from the general session indicated on the program for 4.30. That will give Prof. Beal time to read his paper in full, and the time left over we will divide equally for the discussion of the two papers. We may have about 10 minutes for the discussion of Prof. Lee's paper.

Dr Charles Forbes—I think we teachers of Rochester greatly appreciate the opportunities this convention affords for valuable advice and instruction. I have been a teacher for many more years than most of those who are present, and I am thankful that my teaching of physiology has extended from the grammar school, the high school to a professorship in college. What I wish to say is based principally on my experience in teaching this subject. I have taught thousands of pupils in physiology, and have not found that repugnance to the subject mentioned in the paper. The methods suggested by the writer are most excellent. The statement that there is not sufficient distinction made between anatomy and physiology may be true in many cases, but our textbooks are quite definite in regard to this matter. I agree with the writer that our textbooks are overloaded with anatomy, containing more than the subject of physiology demands. This, I judge, is one reason why there is a dislike to the study. As regards the physiology of botany, or vegetable physiology, Prof. Gray made it clearly understood many years ago that, while this is closely related to animal physiology, the two are distinct sciences. The subject has been made so clear that teachers ought not to let their pupils get the impression that human physiology comprises all of physiology.

At a convention like this so many ideals are presented by experienced teachers, that, while they meet with our approval, yet we are apt to be discouraged because we feel that we are not up to these standards. I think we all agree that the time for teaching the various subjects in our schools is so limited, the students have to do so much work and the teachers become so nervous under the responsibility, that it is very difficult to carry out the suggestions presented. One teacher said to me, "I am almost discouraged. I feel that I can not do my work properly, because I can not carry out the suggestions". I replied, "You are doing the best you can, and the teachers are working faithfully".

I have been interested in regard to the time when physiology is to be taught. In our grammar schools it is very elementary,

as it should be, and the children in Rochester are pretty well instructed. Now, when the subject is taken up in the high school, it should be from the scientific standpoint. In most of our high schools it is commenced at once at the beginning of the course. I do not think under the circumstances that this is the proper place. From my experience I should say that it ought to follow physics and chemistry; because, as has been stated, physiology is the study of functions, and these are physical and chemical in their nature, so that, if the student is to study from a scientific standpoint, it will be after the study of these subjects. In this way the time of the student is economized; and we have to economize in this age when there is so much to be learned.

In regard to the note on alcohol, I do not know that we agree on that subject or the statement made. Even if it has been proved that alcohol is a food, is it any better than the other hydrocarbons? Shall we substitute alcohol for what we know is not injurious? I have a boy and girls in my own family; and it is worth something to have the children know what are facts even if they are exaggerated in the opinion of some, and I am very glad to have my children come home and tell me what they know about this subject. I am a physician, and, looking at these things from the standpoint of a physician, I do not fear that our young people will be intentionally falsely taught. The teachers of Rochester are interested in this matter and are doing their work faithfully. The teaching of the effects of alcohol and narcotics has its place in the system of hygiene. It is hardly fair, because one experimenter has announced that alcohol is a food, because he believes that a portion may be oxidized in the body, to assert that our textbooks are abounding in false statements. Those of us who are older and have had more experience in observing the effects of alcohol will still maintain that it is a poison, to be avoided. For this reason we should be careful not to prejudice the teachers' efforts.

Inspector A. G. Clement—I wish to express a word about the paper. I think it excellent, and I enjoyed it very much, indeed. It has been my privilege to visit, during the last year, perhaps as many as a hundred classes in physiology, and in different schools I have taken pains in a large number of cases to ask how they like the study. I found almost invariably that about one third or one half of the class dislike it, and I have attempted to find out why they dislike it, but have not always been able to get answers from the pupils. One or two reasons occur to me, however, as to why they dislike it. I think one reason is because the teachers are giving altogether too much instruction in structure and not enough in function. They certainly teach a great deal about bones and about the structure of various organs without showing the relation to function. Another reason is because too much instruction is given in regard to the effects of narcotics and stimulants. The pupils begin in the third or fourth grade and every year go over the same thing up to the 10th year. By this time the boys and girls think that the teaching of physiology and the teaching of the effects of narcotics and stimulants are nearly the same thing; and each year, as soon as the teacher begins to give that instruction again as required, they lose their interest and do not care to hear about it. Moreover, when the pupils have finished the work in physiology, if you ask them about the effect of tobacco on certain organs or the effect of alcohol on certain organs, you will find from their answers that they do not seem to know very much about it after all. I think it is unfortunate that some of our best physiologies have been thrown out of the schools because they are not approved by a certain very bright woman in this country. I know where a very excellent physiology was thrown out because it did not conform to her ideas. If teachers would give more practical instruction, as suggested in the paper, and more truthful instruction with reference to narcotics, the pupils would be more interested.

Another word with reference to the time of teaching physiology. I recognize the fact that it ought to be taught more scien-

tifically, and it would be a very excellent thing if it could be; but the truth is, we are required to teach physiology in the first year, and before we can carry out scientific courses it will be necessary to add another course in the senior year of the high school. If that can be brought about, we can perhaps have physiology taught more scientifically than we now do.

HOW SHALL A YOUNG PERSON STUDY BOTANY?

(A sequel to the *New botany* printed in 1879)

BY PROF. W. J. BEAL, MICHIGAN AGRICULTURAL COLLEGE

While studying four years in the classical course at the University of Michigan, and coming under the instruction of Alexander Winchell, I was seized with a desire for more knowledge of natural history. It was two years later, in April 1861, that I went to Harvard to study under the guidance of Agassiz and Gray. In those days the gross anatomy, morphology and the classification of animals and plants were about all that received much attention.

Agassiz said he was glad to see me there and asked a few questions, observing that, "You must make up your mind to be a poor man all your life if you become a naturalist. With my mode of treatment students are about sure to become discouraged at first. I shall try your patience. You have read books, but have not studied the subjects themselves. If you study with me, you must not look at a book for some time, for several months. You must learn to see, to observe for yourself. After students get started once in this way, the longer they study here the better they like it, and the more reluctant they are to leave." After some more questions, he handed me half a dozen dead sea-urchins, and left me with the remark: "I want you to see what you can make of them, and in a day or two I will see how you get along." He assigned me a table in the laboratory, where ten or a dozen other special students were at work, the floor being largely covered by cords of shallow wooden boxes set tightly over each other, containing various kinds of specimens. This was a queer way to study—six dry specimens about as large as so many

Baldwin apples and no books! I looked them over and over, part of the time using a small hand lens. I was glad when night came, for it seemed as though I had learned all there was to be learned of sea-urchins. I broke them to pieces and made some drawings. The next day the professor called with a smile, saying, "Well, Mr Beal, what have you seen?" He glanced at the drawings, and I told him what I had done. He gave me a very few general hints of what to look for, and a few names of the parts, noticing some mistakes, but made no corrections.

I supposed all of one day spent on these specimens certainly was enough. Not so; I was to study them longer. Thus he called every day for about five minutes during a period of three weeks, hearing what I had to say till I made some mistake, when he uniformly turned on his heel and left me, saying, "You are wrong." I was surprised at my own work—surprised to find at the end of the three weeks, that I was discovering something new every day. You must understand that, during this time, I had only two lectures a week on other subjects, devoting all the rest of the time to sea-urchins. After this I dissected specimens which had been in alcohol, and occasionally went to Chelsea beach to get fresh, living specimens, which I examined while in motion. I began to learn to see sea-urchins, and it made little difference to me whether it was daylight or dark, whether the specimens were before me or not; visions of sea-urchins in all their details were all the time before me.

In a similar manner one species of star fish was examined, its examination occupying a week or so. Agassiz says: "These two animals, the sea-urchin (a flattened sphere) and the starfish (with five rays or arms), are composed of similar parts arranged in a similar manner. Learn how it is." The comparison occupied several days. The next specimen was a spatangoid, an animal somewhat different from either of the others. "Now homologize those three." Then a third and a fourth specimen were given me, differing from the others in appearance; and I was told again: "Compare. It is easy to observe isolated parts—any one can soon learn to do that; but, when you compare two objects, you

take a step in philosophy." In one case I was asked to make a paper model of a coral, to illustrate my idea of the hard portions. Corals were compared with sea-urchins and starfishes. This work occupied me for more than two months, and during all this time Agassiz never corrected a mistake, but kept me working till I found out for myself. Perhaps it was three months before I was permitted to see books on these subjects, but at that time their contents were carefully read and fully understood. Agassiz often said: "Study specimens and refer to books, and not the reverse, as is usually done. Textbook knowledge about nature does not amount to anything; it is a very poor basis of culture."

It has seemed to me that the work with Agassiz helped me more than that of any other teacher with whom I ever came in contact, and yet no teacher ever told me so little. I learned to observe and learned to rely on myself. At that time we supposed that this kind of work was beginning the study of zoology in the right way, but in these days, some people are trying to make a new thing out of it, by calling it nature study. Nature study is seeing the things which one looks at, and the drawing of proper conclusions from what is seen. In this connection it may be well to keep in mind Dr Goodale's definition of botany. "Botany attempts to answer all reasonable questions about plants."

I spent months studying asters, goldenrods, sedges and other plants in the laboratory with Dr Asa Gray, who was always on the alert to keep me on the right track and point out the mistakes at once, saying, "It isn't worth while to pursue a subject when you have got off the right track."

For at least half a school year of daily work in beginning botany, I require all students to pursue the plan of studying plants and not books. By all devices, I seek to get the results of the combined observations of all members of the class before I tell them what I think, or before they study books on the topic. It makes no difference what grade of a high school or what class in a college they belong to, the process is the same. With young pupils and undergradutes, I do not carry out Agassiz's plan to the full extent, but keep it constantly in mind, tempering the severity of the breeze to the shorn lambs.

After the students have learned well how to see for themselves by practising for 18 or 20 weeks, in succeeding terms, I am by no means so particular to adhere to this plan.

In many of our elementary textbooks in these times—and they are numerous and multiplying rapidly—authors recommend the study of what they call types. For example, they advise studying one spirogyra, one vaucheria, one mucor, one puccinia, one ascomycete, one marchantia, one polytrichum, and so on through, from low protococcus to one of the highest—the dandelion. In pursuing this plan, my experience convinces me that most students fail to see the connection and lose interest in passing from one isolated family or class to another. It may be well enough to study types, but pupils should not fail to study in that connection a considerable number of species that are somewhat nearly related, and by this means have the benefit of comparing similar objects. After learning the structure of one violet, it is better to examine the structure of at least 10 other species than to spend the same time studying a single crowfoot, a chickweed, a geranium, a spiraea, a rose, a mint, a phlox, a mallow, a dandelion, a fern; though each of these may be studied at other times in connection with allied forms.

25 years ago, we often met teachers in Michigan who required their pupils to begin botany by getting lessons from a textbook, where they saw some pictures and diagrams, instead of plants or some of their parts. This was the practice, specially in winter, when it was declared no specimens were to be obtained. I am sorry to say that such persons in the back districts are still retained as teachers. Perhaps I ought not to mention this matter in New York; but it is not three years since I met one of your teachers, occupying a high place, who followed the book lesson plan, with little or no use of specimens. Is it possible that he was unable to procure large seeds of some common plants and set his pupils to observing, experimenting with, and growing them in the classroom? Had he not collected many dry seeds, fruits, and racemes in summer and kept them in bunches or in loose sacks hung on the nails in the rafters of an attic till wanted in winter? The fact appears not to

have entered his head, that he could secure, each in its season, a great assortment in quantity of the soft fruits and buds of flowers—that he could keep these in jars in 2% of formalin till wanted. They will retain their shape and part of their color very well, and the odor of formalin disappears after washing in water for a few minutes. True, we can not collect roses from a New York garden in January, nor maple blossoms in February, but our trees and shrubs in their winter garb furnish excellent lessons to employ pupils profitably for many weeks of winter, and this all comes within the scope of botany, just as much as if we examined flowers in May or June. By the roadside, in the swamp, in the woods or the front yard, are hundreds of branches of a hundred kinds of woody plants, the buds of which are formed in summer and resting in winter, some of them waiting to be studied by inquisitive pupils. The branches have pith, wood and bark, to say nothing of the delicate contents of buds. Students can pursue the following order with branches of our elms and find plenty to do.

1 Note general characteristics of branches, including the arrangement of buds and the abortive stem above the upper bud.
2 Lenticels, corky ridges, and the bark.
3 Leaf scars, their position, shape, structure.
4 Scars left by the bud scales, and minute buds in their axils.
5 Scars left by some of the dying buds.
6 The buds { 1) those containing a stem and leaves,
2) those containing flowers.

The longer I teach, the less I lecture my students, and the talks that are given are mostly regarding things which the students have previously examined. As a rule, I have to keep cautioning our instructors not to lecture so much. I have had some who apparently delighted to show their wisdom and would spend more than half the laboratory hour in telling students what they should attempt to discover for themselves or in giving other information. Students are inclined to like this plan, as it is so much easier and quicker to get information this way

than to work it out for themselves. They do not reflect that they are pursuing the study to learn how to work rather than to acquire information.

In 1869 I gave members of the junior class in Chicago university some lectures on zoology; I was particular to tell them about the structure of the heart, and the circulation of the blood. Two of the class afterward dissected a dog that was good for nothing else. They wondered what those broad things were at the large end of the heart, and were going to cut them off and throw them away, not mistrusting that these weré the auricles about which I had told them the day before. In 1885 I gave to an advanced class five illustrated lectures on the pollination of flowers. After the course, I asked questions and made the following récord in my notebook. "As far as the lectures are concerned, many points were imperfectly understood, erroneous notions were entertained. The five lectures were to a great extent a loss of time, which could have been spent to better advantage by a careful study of the flowers of several living species."

Better than lectures I have found the following, not omitting laboratory work. I teach agricultural students something concerning grasses, weeds, parasitic fungi, forestry, plant physiology. After they have done some laboratory work, students are supplied with duplicate books, bulletins, or separates, which treat specially of the subject in hand. These are read by each one during the laboratory hours, and the students take their time for making good notes. These books and bulletins are a part of the laboratory equipment. For example, beginners study seeds and seedlings of peas and beans for four hours, making some notes and drawings, after which I give each a copy of my bulletin, no. 1, on elementary science, which treats of the same kinds of seeds and seedlings. Copies of this bulletin are on the table at this meeting. Wheat and buckwheat are studied in the same manner, and later seeds and seedlings of timothy and clover, each time finishing up with a bulletin. I can conceive no more desirable method than to have the whole series of topics which

are studied during a term, written up and illustrated in this manner, that the text and cuts may not be seen till considerable attention has been given to the objects. In case a book is furnished to a beginner, while he has specimens, he is almost certain to use it as freely as a student would use the translation of a German or Latin text which he is trying to translate.

In Michigan, many persons preparing for examinations with a view to securing certificates, cram in botany and zoology, physics and chemistry, instead of making original observations or of making the experiments for themselves. Not long ago our state superintendent of public instruction introduced a fine scheme for a part of his examinations in botany. Those who were trying for state certificates, were given some questions to be answered in writing on the usual plan, while another part of the examination consisted in using a stage misroscope with paper and pencil and no books to give the result of their observations concerning some fresh plants placed in their hands. Such questions are most admirable, and are fair, but in this case most of them were unanswered, showing that the candidates were destitute of the most important part of the preparation. Some of them failed to make a passing record. In examining candidates to enter an advanced class, I invariably make considerable use of laboratory work and less of oral quizzes.

Students should keep the following four points constantly before them to aid in arriving at correct conclusions.

1 Where possible, examine many specimens of one species.

2 Pay considerable attention to counting and measuring and finding the relative sizes of the parts studied.

3 Carefully compare homologous parts of allied species.

4 Study plants of any species in all stages of development.

As we must expect, beginners are often at a loss to know how to express themselves clearly and fully, specially in writing descriptions of plants or parts of plants that they have never seen before. Their notes are very often too meager. After all have tried and done the best they can, I show them what I can do,

or permit them to copy an apt description from some book or from a blackboard. After repeating this process for several times, they soon begin to acquire considerable skill in description.

I like to keep a syllabus of the course on the blackboard or to have it on a chart hung before the class.

Many textbooks contain in the introduction or in some of the early chapters a lengthy account of the classification of the subjects treated in later chapters. Here they attempt to teach classification before the beginner has acquired a knowledge of facts as a basis sufficient to comprehend the text. I wish to call your attention to a notable exception to this rule in a *First book of zoology* by E. S. Morse, published more than 25 years ago, before some of you were born. The plan is admirable. The author speaks to his pupils by text, and excellent illustrations of snails, clams, insects, centipedes and lobsters, and in the last part of the book, where you would least expect to find it, he inserts a few chapters concerning natural groups. Here we have the natural order of work; a multitude of facts are given before the author attempts to generalize or classify.

What I term beginning botany, is expected to continue daily for 18 or 20 weeks, devoting an hour and a half a day to the laboratory, with sections containing each 25 to 30 persons. Each student is furnished with a stage microscope, with two needles in handles, a pair of forceps and usually a small knife. During this period the teacher must see:

1) That he learns to use these instruments to best advantage, correctly. 2) That he learns to draw diagrams, vertical and cross-sections, rather than artistic views. 3) To make good and full notes. 4) To learn something about plants.

In certain cases, I find it very instructive to require students to make models out of paper or out of large rutabagas or potatoes.

Certainly in no course should a student attempt to study everything pertaining to botany. We must select with reference to that which is most suitable for students that we teach and the apparatus that is available. We select what will give the best

training, and lastly that which will give the most useful information. If all were intending to pursue the study of medicine, or of mechanical engineering or of agriculture, or of horticulture, the fact might influence more or less the topics to be selected, but the pupils in most schools will pursue a great variety of callings after completing a course, or before that time. We must keep in mind all the time that "what a man can do is more important than what he knows."

For acquiring the power of daily observation, there can be nothing better than the study of the gross anatomy of plants, and for cultivating the judgment, plant morphology is unsurpassed, specially where frequent comparisons are insisted on. While these two lines of work are kept at the front, from the first lesson on the first day and all through the course, I encourage every student not to forget to ask himself the question, "Why and how?" This will call in more or less physiology, oecology, description and classification or relationship. Under oecology specially these questions are always interesting: why plants are not all found in the same region, why they do not all flower at once. Here come in the modes of plant dispersal, the struggle for existence and more room, zonal distribution, plant communities, adaptation to climate, how plants protect themselves.

Fortunate, thrice fortunate is the botanical teacher who can draw diagrams well and with some alacrity, for it helps amazingly in making explanations. It will save many tedious repetitions in the explanations, if a short syllabus or specific statement be produced in duplicate, so that each student can have a copy. There will always be some in a class who were not giving close attention when something was said, or some member will be absent.

No person for the first 20 weeks of botany should be at the trouble of learning to use a compound microscope. He should leave it, till he has made a somewhat intimate acquaintance with the gross anatomy of plants.

There are a dozen or so designs or blank forms published, having spaces opposite printed names, in which to answer direct

questions about a plant in flower. It is well enough to place about three copies of this in the hands of each student as he examines three different plants, but to continue their use for a greater length of time will tend to relieve the student of thinking and make a machine of him. The quicker he learns to ask his own questions and answer them the better, even at the risk of some omissions.

It seems to be necessary to spend some time in the classroom, to aid pupils in becoming familiar with artificial keys which lead to families, where a plant in hand may be described and named, but, with the other instruction provided for, but little time need be given to this work. This work is too often spoken of as analyzing plants, instead of identifying plants. I place a very low estimate on a common practice of requiring each person in a class to collect, dry and mount 50 to 100 plants.

I have not had much experience in conducting field excursions, because my teaching has been done at a college which has a large campus containing a great assortment of trees and shrubs, and because there is at hand a botanic garden where the plants are arranged in families, each plant growing back of a label which contains its name. It is a part of our plan in the spring term to go once a week, with the students in small companies of about a dozen, where some interesting features can be pointed out.

A botanic club or a natural history society in a school is well worth encouraging. Let it be officered by the students, and help them to get up programs, remembering that no society of this kind can long maintain an interest among its members, if they plan to have little else than a lecture at each meeting. The members should be the actors on the program.

I inclose a copy of a reprint from the first report of the Michigan academy of science, entitled:

SUITABLE TOPICS FOR DISCUSSION BY YOUNG MEMBERS OF A BOTANICAL CLUB

BY W. J. BEAL, AGRICULTURAL COLLEGE

(Read before the Academy, April 1, 1897)

In some respects the botany taught in our agricultural college should be unlike that introduced into a portion of the courses in a university. For example, the young person bent on agriculture or horticulture in any of their departments would not need to spend time in the study of mosses, liverworts, lichens, or algae, or many of the saprophytic fungi. On the contrary, he does need to learn the names and many of the peculiarities of our native and introduced trees and shrubs, the same of the leading grasses, clovers and other forage crops; he needs a familiarity with our weeds, including the seeds of cereals and other field crops, our parasitic fungi, especially those injurious to cultivated crops and weeds of all kinds, and some knowledge of the anatomy and physiology of the higher plants. In a word, he seems to have a greater need of the old-fashioned systematic botany than is generally expected in these times in the courses of a university.

Especially should the agricultural student from the start take much pains to become a close and accurate observer of plants in the field, orchard, and garden, in fact anywhere found.

For such a course the electives need not be numerous.

For many years past at the state agricultural college there has been a natural history society with meetings once a month, at which the observations reported referred mainly to agriculture, horticulture, botany, zoology, and entomology.

A little over six years ago, a botanical club was established with meetings in the botanical laboratory three or four times a month. The attendance averages from 10 to 20, with a membership of about 50.

During these six years of its existence, there have been presented 219 topics. Most of the members are mentally young. I have here a list of 75 or more of these topics, which seem to be models of their kind for such members to consider. As one of the objects of the State academy of science is to encourage young people—or older ones either—to pursue some lines of investigation appropriate to our aims, I thought this list of topics would be interesting to such young workers or members of a young natural history society. It may be needless to say that in nearly every instance the paper or talk gave the results of personal observation.

A comparison of the fruits of our three elms.

The flora of Michigan, some notes on.

Beech drops.

The odor of plants.
The box elder.
Proper work of a botanical club.
Thistles of the neighborhood.
A study of the leaves of arbor vitae.
Comparison of the buds of several oaks.
The fruit of the red mulberry.
Comparison of the twigs of three pines.
The roots of the red clover.
Pop corn, before and after popped.
The roots and leaves of a young wheat plant.
The report of a field day.
The flowers of campanula.
The flowers of the common sage.
Petiolar glands.
The life history of corn smut.
Notes on how to observe.
Notes on leaf galls.
The attractions of the botanic garden.
A talk on wheat.
Remarks on native goldenrods and asters
A comparison of beechnuts from several trees.
Large varieties of fruits of a hawthorn.
Autumn leaves.
How botany is taught at the state university.
Notes concerning Dr Watson of Harvard, recently deceased.
Detecting the adulteration of buckwheat flour.
A talk on some of our ferns.
A talk on the origin of cultivated plants.
Some of our fresh-water algae by an amateur.
A fungus growing from the neck of a larva.
The adulterations of tea.
Observations on the black knot of the plum.
The adulteration of coffee.
Fasciation in a dandelion.
Our erysiphae and their hosts illustrated.
Report of the meeting of the A. A. A. S.
Different forms of leaves on the same plant.
Carnations, structure, etc.—the models.
The "flow" of sap in the sugar maple.
Questions asked of the botanist of the experiment station.
Our willows—illustrated.
Some of our earliest grasses.
The structure of a puffball.
Plans of some experiments for preventing smut in oats and barley.

How to kill quack or couch grass—why?
Botany as seen in the German exhibit at Chicago.
Some of the curious plants grown in the greenhouse.
Four persons talked of as many different kinds of smuts.
Our native orchids.
Two kinds of wild potatoes grown in the botanic garden.
Some of the fungi grown on tomatoes.
The cross-fertilization of wheat.
The improvement of our wild fruits.
Some monstrosities among plants and their meaning.
History and development of some of our grapes.
The mode of distribution of some seeds.
Observations on Michigan pines.
The irregularity in the germination of seeds of weeds and the advantage to these plants.
Sub-irrigation in the forcing house.
An exhibit of seedling willows.
Observations on oak galls.
A comparison of plants of wheat and chess.
An exhibit of tomatoes grafted on potatoes, both bearing crops—double cropping.
Experiments with smut on wheat.
Concerning the State academy of science which met at Ann Arbor June '94.
A visit to Greenland by one of the founders of the club, Mr Orth.
An exhibit of fruits of our native trees and shrubs.
A plant of wild strawberry in the botanic garden had produced by runners 1234 plants in one year.
The structure and use of bulliform cells in the leaves of some grasses.
The structure of root tips of wheat, and some branching hairs.
Squirrels dropping cones from trees and biting off limbs.
Exhibition and description of an artificial cell to show turgescence.
Report regarding the abundance of variegated corn in the field.
The life history of Monilia—plum rot.
An exhibit of chess which had germinated on ice.
An account of cutting wild rice, rafting down the river and curing for hay in '95.
Report concerning a visit to the U. S. department of agriculture and the M. A. C. men there employed.
The management of the woodlands of the college farm.
The structure and history of the navel orange.
Fairy rings on our lawns (marasmius).

A meeting in the evening at the botanic garden to observe the opening of flowers of the evening primrose and to see insects at work on various flowers.

The crossing of pop corn and field corn.

Life history of rust on wheat and barberry.

The seeds of weeds.

I hardly need to add that any botanical club or natural history club will make slow progress and work to very great disadvantage unless one or more of the members possesses already a very good knowledge of one or more divisions of natural science. If possible, such members will be of more aid in securing interest than a library.

For many years, I have assigned each term one or more suitable topics, a different one to each member of the class, which he considers his personal property. These topics the pupil investigates thoroughly so far as he can, and each member in turn presents his paper, or talk, usually with illustrations, to the other members. The quality of the work like that of a recitation is credited as equivalent to two or three or more good or poor recitations. I have uniformly found that students took an interest in this plan. For numerous suitable topics consult the *New botany*, noticed elsewhere.

Frequently an opportunity arrives for advertising the members of a class a little. I consider the time well spent, provided the preparation is all of it in line with the legitimate work of the class during that term. Some of the teachers may be interested in a plan which I tried in 1886. In Michigan we have a thrifty state horticultural society that holds meetings in different parts of the state, thus performing missionary service. A meeting was to be held near the college with which I am connected. College was in session. I thought to stimulate the students of a certain class and interest the members of the society. 17 young persons gave three minute talks to the horticulturists on topics which they had been studying by the aid of the compound microscope. The subjects of the talks given were as follows: 1) structure of a leaf; 2) the mouths of a leaf; 3) young hairs of a leaf; 4) sting of a nettle; 5) talking and showing drawings of protoplasm in motion; 6) palisade cells in a leaf; 7) starch of

common and wild potato from Arizona compared; 8) the framework of a leaf; 9) fibers of cotton, flax and wool compared; 10) why nuts are hard; 11) tough and brittle white ash compared, as seen magnified; 12) structure of a grain of wheat; 13) pollen and its growth; 14) quince rust; 15) corn smut; 16) a study of common bread mold; 17) effect of severe cold or heat on the cells and their contents.

The secretary reported: "The drawings were admirably executed, and on the whole the entire exercise was as interesting as anything ever presented to the society." The illustrations were copied and with the text appeared in the report of the society in 1886, which gratified the students and probably did them no harm. Some of you may find occasion where a short exercise illustrated and presented by a class, each saying a little, will attract much greater interest than where only one or a very few speak longer. And no doubt some of you may have already tried this plan.

Even for college students I have found it beneficial to write neatly on the blackboard some motto or sentiment which shall catch the eye for two or three days. Here are some that I have used. No real progress can be made in botany, till the student learns to observe. Neatness begets accuracy. "Mere book knowledge of natural history is a sham and a delusion." (Huxley) "The pupil must earn his facts." (Goodale) "The teacher of biology will keep the student on the right track, but let him find the truth himself." (Farlow) Make frequent and thorough comparisons of two or more plants or similar parts of plants. "In biology, laboratory work should precede any detailed course of lectures." (Farlow) Details and facts before principles and conclusions. To learn to observe well, concentrate the attention for some time on a very small portion of the field, then in like manner study other portions. As an instrument of research, the microscope now occupies a position which is second to none. A trained eye is valuable in any kind of business. Merely learning the name of a plant or part of a plant can no longer be palmed off as valuable training. Correct teaching of botany is

simply giving the thirsty a chance to drink. He who expectorates on the floor must not expect to rate high in his class. To lose a lesson is to unsettle a week. "He who can teach only by the book had better not begin." (Prof. Wesley) "From first to last the student should be an investigator." (Prof. Wesley) "Patting one on the back and saying, 'Don't you see this?' and 'Don't you see that?' does not tend to produce a very robust mental development." (Farlow)

You should not neglect to tell the members of your board of control, whether they like to hear it or not, that giving good instruction in natural history is costly, but, notwithstanding the cost, no one in these times can lay claim to a liberal education who has not had a pretty good drill in botany or zoology or both of these. By costly, I mean not only to take into account the apparatus required, but the sizes of the sections and the hours for the work. For example, it costs about five times as much to teach a class of 30 in the subject of parasitic fungi as it does to teach the same students history or political economy.

None of us will ever live to perfect a course in botany that will stand the test of future discoveries and methods of teaching, nor shall we ever agree for a single year as to what should be taught or how it should be taught. In his report for 1888-89, Pres. Eliot said:

> During recent years every college teacher has been forced to answer anew the personal questions, What can I best teach, and how shall I teach it? Every man has really been obliged to take up new subjects and to treat them by new methods. There is not a single member of the faculty who is today teaching what he taught 15 years ago, as he taught it then. Each teacher has to recast his work . . . and the faculty has to invent, readjust, and expand the comprehensive framework of the course.

Altogether likely most of those present agree as to the great value of a training in botany. I venture to give my opinion:

1 There is nothing better for training the power of observation.

2 The comparison of one plant or one part of a plant with another cultivates the power of inductive reasoning.

3 In learning the definition of new words, the memory is strengthened, the vocabulary enlarged.

4 There is nothing better to train the power of precise and brief description in using each word with a definite meaning.

5 To follow successive changes that take place in shape, proportion, size, color, as seen in one plant from seed to maturity, develops the observation, powers of description, and the judgment.

6 By experimenting to learn the results that follow changes in temperature, light, moisture; by mutilating or removing certain parts, many facts may be obtained, enabling one to arrive at certain correct conclusions.

7 To become acquainted with the minute anatomy of plants by the aid of sections made in different directions and seen with a compound microscope, cultivates the imagination as well as the powers of observation and reasoning.

8 The preparation of materials for examination trains the hand to precision as well as the eye and the judgment.

9 "In studying botany a student gains in analytic and synthetic powers." (T. C. Abbot)

10 "It is the best system of practical logic, and the study exercises and shapes at once both the powers of reasoning and observation more probably than any other pursuit." (Asa Gray, who possessed a good knowledge of mathematics and Latin as well as of botany)

What shall I say of the value of training acquired by studying bacteria and lichens, by experimenting to demonstrate that certain fungi, like wheat rust and many others, assume two distinct forms on each of two different host plants?

In these times textbooks for beginners are appearing in rapid succession. It is a barren month in which one or more are not published. In two instances within my knowledge, the editor has prepared two books for young students, and in one case three books by one author have appeared within a period of two years. New textbooks are always welcome to teachers, but the difficulty of selecting just the right one is not so easy. What does this

influx of botanical textbooks mean? Simply this, there are many persons interested in botany, and the subject is undergoing rapid changes. New discoveries in new channels make it an inducement for teachers to try a hand in making a new book. At present, the subject is in a somewhat chaotic condition. I have shown myself lacking in decision of character, by inability to select a textbook for beginners that just suited me. I have tried several, to discard at last all of them; and finally, to put into the hands of competent instructors—and no others should attempt to teach—I made a small work myself. Of course you have not seen it, for it is not in the list of any publisher. In the preface I wrote the following lines:

> I object to telling students at every step what they are to see, or to imply as much by numerous direct questions. I think it unwise to place in the hands of a beginner a book containing good pictures of what is to be learned from specimens. To give him a full text and good pictures is much like placing a translation in the hands of one who is studying Greek, Latin or German. Excepting as a model now and then, I do not think it best to supply printed schedules for plant study.

With those views in mind, all we need to put in the hands of a student is a brief outline of the course and a good glossary at the end of the pamphlet. Students are all supplied with good specimens in abundance at all times of the year; then what are pictures for except to tell the student what to look for? Having seen that, he believes he has seen all there is to be discovered. His curiosity ends then and there. Neither is it a good plan to lecture a class of young students implying that you are telling all there is known on a certain point—that there is nothing more to learn about the subject. Tell them rather, that no one knows it all, that here is a fine chance to make original investigations and you are about sure to be right in such statements.

As helps to teachers of botany, no one can afford to neglect to read the *Teaching botanist*, by W. F. Ganong, published in 1899 by Macmillan.

To my students, who are about to study with the aid of a com-

pound microscope, I take great pleasure in reading parts of a most admirable paper by Dr W. G. Farlow on biologic teaching in colleges, printed in the *Popular science monthly*, March 1886. Some of you may like to secure a copy of the *New botany*—a lecture on the best method of teaching the science by W. J. Beal. Third edition. 1890. 10c. Published by the *Rural New Yorker*, 409 Pearl st. New York.

PARTIAL LIST OF ELEMENTARY TEXTBOOKS ON BOTANY

Atkinson, G. F. Elementary botany. N. Y. 1898. Holt $1.25.

——— Lessons in botany. N. Y. 1900. Holt $1.

Bailey, L. H. Lessons with plants. N. Y. 1898. Macmillan $1.10.

——— First lessons with plants. N. Y. 1898. Macmillan 40c.

——— Botany: an elementary textbook for schools. N. Y. 1900. Macmillan $1.25.

Barnes, C. R. Plant life considered with special reference to form and function. N. Y. 1898. Holt $1.12.

——— Outlines of plant life, with special reference to form and function. N. Y. 1900. Holt $1.

Bergen, J. Y. Elements of botany. Bost. 1896. Ginn $1.20.

——— Foundations of Botany. Bost. 1901. Ginn.

Bessey, C. E. Essentials of botany. N. Y. 1896. Holt $1.08.

Bower & Vines. Course of practical instruction in botany. Lond. 1885. Macmillan.

Campbell, D. H. Elements of structural and systematic botany. Bost. 1891. Ginn $1.

Clark, C. H. Laboratory manual in practical botany. N. Y. 1898. American book co. 96c.

Coulter, J. M. Plant relations: a first book of botany. N. Y. 1899. Appleton $1.10.

——— Plant structures: a second book of botany. N. Y. 1899. Appleton $1.10.

Darwin, F. Elements of botany. Cambridge Eng. 1895. University press.

Evans, E. Botany for beginners. Lond. 1899. Macmillan.

Gray, Asa. Elements of botany. N. Y. 1887 and later editions. American book co. 94c.

——— How plants grow. N. Y. 1862 and later. American book co. 60c.

Kellerman, W. A. Elements of botany. Phila. 1883.

Macbride, T. H. Lessons in elementary botany. Bost. 1896. Allyn & Bacon.

Macdougal, S. T. The nature and work of plants. N. Y. Macmillan. 1900.

Massee, G. The plant world. Lond. 1898. Whittaker 2s 6d.

Newell, Jane H. Outlines of lessons in botany, pt 1 and 2. Bost. 1892. Ginn 90c.

Rattan, V. A popular California flora. San Francisco 1882. A. L. Bancroft & Co.

Setchell, W. A. Laboratory practice for beginners in botany. N. Y. 1898. Macmillan 90c.

Spalding, V. M. Guide to the study of common plants. Bost. 1895. Heath 90c.

Willis, J. C. Manual and dictionary of the flowering plants and ferns. Cambridge Eng. 1897. University press 10s 6d.

Prof. James H. Stoller—I would suggest that the discussion of Prof. Beal's paper, so interesting and so full of practical suggestions, may be had very well in connection with the paper to be read tomorrow morning, the "Framing of a course in biology for untrained minds". I suggest, with Prof. Beal's consent, that we defer the discussion till that time, and, if we come promptly together, we shall have time for the discussion of both papers.

Section C. EARTH SCIENCE

PRACTICAL EXERCISES IN PHYSICAL GEOGRAPHY

BY PROF. W. M. DAVIS, HARVARD UNIVERSITY

There is coming to be a general recognition that physical geography must not be taught by recitations alone; that laboratory and field work should be systematically developed for the better understanding of the principles and examples set forth in the text; and that a proper assignment of space in the school building and of time in the school curriculum should be made for the accomplishment of these practical exercises. There is a growing movement in favor of practical exercises; a movement whose strength is to be measured not by the number of teachers who are standing still, indifferent to this innovation on traditional methods, but by the number and character of the teachers who are striving, often against difficulties and discouragements, to promote the rational development of their subject. There was a time only 10 or 15 years ago when a "geographical laboratory", as the name for a room specially set apart and equipped for practical exercises in geography, had no place in the school architect's plans; but, if one may judge from the amount of inquiry and correspondence as to what a geographic laboratory should be and as to what it should contain, such a time is passing by. Let me then devote this address to certain considerations regarding practical exercises in physical geography, in the hope that my suggestions may find some application in the construction of new school buildings, in the arrangement of new school courses, and in the appointment of new school teachers, as well as in the remodeling of old ones.

First, as to the place in which practical exercises are to be carried on. An ordinary schoolroom, fitted with desks of the usual size, one for every pupil, is unsatisfactory in not affording proper accommodation for the maps and models which the pupils are to study, describe, or copy. Broad tables near good-sized windows, and movable or suspended racks are well nigh indispensable. Hence the importance of having a room specially set apart for work of this kind, a laboratory in which dust-proof racks,

cases, and closets give convenient storage for materials not in use, a laboratory adjoining the classroom in which recitations and lectures on geography are given. The laboratory need not be so large as to contain table space for an entire class, for the class may to advantage do much laboratory work in small sections—indeed, if no special laboratory is provided, the enterprising teacher will do all he can on ordinary desks; but it is a pity to hamper good work by unfavorable conditions. A combination of classroom and laboratory is practicable in schools of moderate size; but in large schools, a geographic laboratory is as important as a physical laboratory, and in the modern school buildings, where so much consideration is given to every need of the teacher, the geographic laboratory is, we are glad to say, coming to be included in the architect's plans.

The practical teaching of geography needs furthermore a flat space on the roof for observation of the sky, a basement room where experimental illustrations of land and water may be made without danger of injuring the ceiling of a room below, and a reservation in the schoolyard where a meridian line may be marked and various outdoor exercises may be carried on. It needs also a field for outdoor work, and this is, fortunately, always at hand without expense to the school committee: it is curious to note how generally the school teachers' needs are now served by electric railways, which so greatly reduce the difficulty of transportation.

Let us next consider the subdivision of practical exercises as to kind. The classification adopted should follow that of the textbook in use in the school: in general it will contain four chief groups, the earth as a globe, the atmosphere, the oceans, and the lands. To these four, some would add human conditions as a fifth; but my preference is to distribute this subject over all the others, so that it shall never be separated from them in the minds of the pupils. Latitude would then be taught, not as an abstract mathematical problem, but as an ingenious and practical device which man uses in order to indicate his place with respect to poles and equator. The sea bottom would then be

described not merely as a dark, cold, quiet, monotonous plain, but as a contrast to the light and dark, cold and warm, quiet and active, ever changing surface of the land on which is found that variety which even poets recognize as the very spice of life, and which biologists recognize as the inspiring cause of all its higher growths, culminating in the development of man himself. It is, however, not necessary to give more space here to determine whether the classification shall be fourfold or fivefold, but it is worth while to point out that the exercises devoted to the several groups differ very widely in character. The earth as a globe must be dealt with geometrically; if formal geometry has not been studied by the class in physical geometry, let the work proceed by inspectional geometry. The variety of work here provided is greater than is usually supposed, and is by no means dry or uninteresting or abstract. Some practical suggestions as to its character may be found in an article contributed to the *National geographic magazine* early in 1900. Let me specially urge on the attention of those who are attracted by this division of the subject the exercises by which latitude, longitude, the length of the year, the obliquity of the ecliptic, and the declination of the sun are determined by the scholars themselves, without assistance from nautical almanacs or other external aids. No high degree of accuracy may be reached, but a real comprehension of these problems and their applications may be gained, such as is never acquired by textbook study.

The atmosphere must be dealt with physically. If the class has not already studied physics, let them get a good introduction to its nature by the measurement of temperature, rainfall and other climatic elements; but in the absence of a good physical basis, do not attempt to explain such problems as the general circulation of the atmosphere; that is impossible. Practical exercises on the atmosphere naturally lead to the construction and study of the weather maps with which this country is so highly favored; climatic charts are also susceptible of much more practical and useful study than is ordinarily given to them.

The study of the ocean is both physical and geometric. This *part of* the subject should be handled with a light touch: it is

not worth while to give elaborate attention to the ocean in inland schools; but, if time is allowed, depths, waves, currents and tides all afford excellent material for practical exercises by which useful lessons may be impressed. A tank in the basement may here be employed to advantage.

The study of the lands must be of a kind that will lead pupils to understand what they see in a landscape. For this reason, continents, mountain ranges and plateaus are too large to serve as units. The items that are studied must be small enough to be seen, for it is only by putting together visible units that a good idea of larger areas can be gained. The units must be studied rationally; shown to be the product of ordinary processes, not ready-made articles or the results of a mysterious past. All exercises on land forms should be directed to this reasonable end, not only for the sake of impressing a great truth regarding physiographic development, but still more for the sake of enabling the pupils to see things better. There can be no question whatever that observation is aided by intelligent understanding. Much of this part of the work, indoors and out, must be of a nature that is by many called geologic, though it is not altogether clear why geographers are so generally content to leave to geologists all treatment of matters so eminently physiographic as the weathering of rocks, the wasting of soils, the transportation of land waste by streams, the abrasion of land margins by sea waves. If these activities had occurred only in the remote past geologists alone might lay claim to them; but, as a matter of fact, they are all part of the very living present. A geographer might almost as well be ignorant of the downstream direction of river flow as of the downstream transportation of land waste. From the very first teaching of geography, the young pupil should regard a river as the discharge of the water and the waste of its drainage basin, not of pure water alone, though the ordinary definitions might give him that idea. It is chiefly in this connection that field work is so useful. Children may naturally enough believe that weathering and erosion take place only in books, if they are never led to see the commonplace operations of these processes in the home field. They may reasonably

infer that the physiographic development of land forms is an abstraction, if they are never shown the results of such development in the hills and valleys about their home. All the habitual activities of the lands should be studied outdoors. Farther illustration of certain processes should be given in the school basement or the schoolyard with clay or sand and a hose. Maps, models and pictures of the land forms that have been fashioned by these processes, as well as the briefest series of minerals and rocks that chiefly make up the lands, may be studied in the laboratory.

A well founded belief in the reality of geographic facts is one of the smallest of the good results that follows from the performance of field and laboratory work as contrasted with recitations from a text. Greater and better results are the development of an intelligent self-confidence in the place of a too docile submission to a printed statement; the discovery by a young pupil that he or she is, like the author of the textbook, a reasoning being, capable of finding out things by looking and thinking as well as by reading; above all, the formation of a habit of appeal to the facts of nature by direct observation in order to lay the foundations of science, and of appeal to reason in order to find out the meaning of the facts. If the study of geography is to serve for the education of something more than postoffice clerks and express messengers, if it is to contribute a proper share toward the development of intelligent citizens, then the attention that is now sometimes given to the names of the counties along the southern or eastern boundary of a state should be relaxed, and fuller attention be given to the observation of facts that have a more enlarging interest and application.

Though it is physical geography in the high school that here takes our attention, it should not be forgotten that many exercises of a practical nature should be given in the lower schools. The observational determination of the length of the year, of the mean temperature of a month, of the weathering and washing of land waste ought to be made before the high school is reached. Then the pupil in the high school can do something better; for

example, he can by observation and correspondence determine the difference of longitude between his school and some other school; he can similarly measure the size of the earth, measure the inversions of temperature that occur during anti-cyclonic winter weather, discuss the development of land forms as affected by the wasting and washing of their rocks. Before a satisfactory scheme of high school exercises can be planned, appropriate schemes for the lower schools must be adopted: and, if this state association desires a useful task for some of its members, let a committee be appointed for the more precise formulation of the physiographic work that ought to be done in successive school years. Let me counsel such a committee to be ambitious, and not to content itself with recommendations that can be immediately carried out, but rather with such as will call for some effort on the part of the average teacher. Let us compare notes on the results of such efforts 10 years hence. In the meantime, it is evident that much educational waste can be stopped by a well arranged scheme of work for successive years. Each year should include the work best adapted to it; older pupils will then not have to do elementary exercises. The work of each year will be usefully built on by the work of later years; it will thus be kept as fresh as possible in the pupil's memory. No work will be unnecessarily repeated, and valuable scraps of time will be gained in an economy of this kind. Coordinated work is as important in practical physiographic exercises as it is in arithmetic, algebra and geometry.

An important question is encountered in considering the equipment of a high school for good practical work in physical geography. We must all agree that the first item in the equipment, ranking above laboratory and apparatus, is a good teacher; and by a good teacher, I mean one who has, among other things, actually performed a large variety of practical exercises, has really learned what field work means, and is competent to explore a new district and to discover its field resources in so far as they are related to school teaching. If I may judge from the teachers who have attended my summer course in geography at Harvard

during the past five years, such preparation is rare, because of the novelty of practical work in geography. There is plenty of interest and capacity, but little experience or confidence. We must wait for about two school generations—about 20 years—before such preparation will be general, and we may not always find it even then. The best thing to do now is to give existing teachers every chance to improve themselves, and to give intending teachers every encouragement to make serious preparation for their future work.

The material equipment of a physiographic laboratory is today under active discussion. There is no standard equipment yet devised. There is at present no school-furnishing firm ready to supply a complete set of materials, all prepared, leaving the teacher only to make such additions as will serve his individuality or his locality. Here is room for enterprise. In the meantime, we should all expect to find globes and wall maps in a geographic laboratory or classroom; it is now coming to be customary to find also certain large scale maps, such as are published by our government bureaus, and an occasional model; but, when it comes to details, it is evident that the practical exercises must be first planned, and the materials for their accomplishment must then be secured. Your proposed committee has therefore a double task: first to devise the exercises, and second to devise appropriate materials for performing them.

Before closing, I wish to consider some of the external conditions that will help or hinder the attainment of our ideals. Foremost here is the responsibility of the normal schools. It will be at once admitted that an energetic normal teacher of physiography, well trained in his subject, imbued with the scientific spirit and possessing the teaching instinct, may greatly promote the progress that we have at heart; all the more, if he is sympathetically sustained by the principal of the school to the point of gaining a good material equipment. But I fancy that one of the great discouragements that such a teacher suffers is the ease with which normal graduates imperfectly prepared in physical geography secure positions in our schools.

Hence we must look next to the superintendents or other appointing powers, and urge them to require of a candidate as high a degree of proficiency in physical geography as in any other subject; or, still better, to require a specialization in physical geography of anyone to whose hands this growing subject is to be intrusted in high schools and academies. A conference among normal teachers, superintendents, and masters, to determine what shall be done in the school courses in physiography, and what preparation shall be expected of new teachers during the next five years, would be of value if it resulted in raising the present standards; but it would be a hindrance if it gave authoritative approval to the unsatisfactory conditions now existing and took no steps to better them.

An effective external aid to observational teaching is the preparation of local guide books for field work. The physiographic resources of such a district as that surrounding this city (Rochester) can not at present be so well set forth by school teachers as by experts of a larger experience. Lectures and excursions for teachers, such as have been given by your university professor of geology, are very helpful, but their value would be increased if they could be set forth in printed form with due regard to their actual use in schools. For the object here considered, it is not enough that a local guidebook shall present an accurate account of the home district; the account should be presented in the order in which it will be used in the schools, so that it will serve as an immediate aid in school teaching. A local scientific society could do excellent work in supporting the publication of such a guidebook, and thus it would greatly promote its own success in a later generation of members.

It is very evident, in reviewing the various suggestions here made, that progress means work. Experience shows that coordinated work is more effective than scattered efforts. Therefore, I again urge on this association the desirability of appointing a strong committee to prepare a detailed outline of a series of practical exercises for a course in physical geography in high schools and academies.

Prin. G. H. Walden—Yesterday in another meeting I had occasion to discuss the interpretative power of the human voice; and, while listening to Prof. Davis this afternoon, I thought his talk a good illustration of it. Most of us teachers here are familiar with the textbook which was written, I believe, by the speaker; and it is no disparagement to the book to say that many times we teachers have run on paragraphs in it that called for some hard work and special interpretation. Now that we have heard the professor's voice, it seems to me that we can understand that book far better than we otherwise could.

What little I have to say on this paper is said from the standpoint of the elementary schools, which I have been asked to represent. One of the most encouraging signs of the times in elementary school work is the fact that men like Prof. Davis, and others of fame in the realm of science, are willing to get down and talk the kind of talk that we of the elementary schools wish to hear, and propose to us the kind of work that comes within the reach of our activities. It is not very long ago that it was almost impossible for us to get such consideration as we now receive. As these men tell us of the equipment necessary to carry out this kind of work, we oftentimes become discouraged, specially when our work is thrown into comparison with the work of high schools and colleges, and we see what these institutions have in the way of equipment to help them. Now this idea of a laboratory in a school building seems to me to be just as practical in an elementary school, in a grammar school, as in a high school; and I often wish that the hard-headed business men on boards of education could listen to these men, listen to the instruction that is oftentimes given to us teachers, and put themselves in our places. Does any teacher here doubt for one moment that both children and teachers would be in almost a state of ecstasy, if they could have a room for a laboratory, and go there and do the work that comes within the understanding of the elementary school boy and girl? I have never heard of such a thing. I have seen a little corner of a hall where there would be sand tables perhaps,

but not such an equipment as Prof. Davis has mentioned. I believe most sincerely as an elementary school man that much of this work ought to be done in a laboratory; I believe emphatically in making physical geography a part of the elementary school course from a very early age. I have been interested also in nature study. It is generally conceded by psychologists that there are two conditions that young children should come in contact with in observation. One is that the thing should be large, and the other that it should be active. Now take nature study as it is commonly taught in the lowest grades. Take the flower from some plant, dissect it, and learn the names of its parts, as is often done. Such small, painstaking work can not hold the children's attention long. Now, on the contrary, take them on a walk and point out the physiographic features that come within the reach of their understanding, and in a moment they are captured. There are teachers here who have been out with their classes; and, I think, they will testify that, if they themselves are prepared in advance, they have little difficulty in teaching the lesson of the occasion. I favor geographic nature study; and I would have the greater part of nature study a matter of developing better knowledge of surroundings in general, and not so much a thing of detail, with young children.

In listening to this paper I was specially struck with the flat roof idea. That of course could be considered in the matter of building and equipping a new school; and in large cities, where playgrounds are the exception rather than the rule, it would be, as suggested, a place where observations could be made and where things could be left without danger of molestation. There would be no disturbing conditions, such as occur frequently in schoolyards, specially those that have no fences. As regards the study of the topography of the school district, in the city that idea is practical, and is usually, I think, carried out by the teachers who are interested in this branch of the work.

It would be useless for me to try to go through the various points of this paper that we have just listened to, and attempt to show what particular relation they bear to our daily work here in the city. I should like to say for the benefit of any who are here, and are not acquainted with our school system, that there has been in progress for several years that change that Prof Davis is willing to give so much time really to accomplish. Nothing that he has said this afternoon has given me more pleasure or more courage than that he is willing to wait two generations for progress. I have one word to say here, suggested by the very fact of the gentleman's reading this paper. There has been unfriendly criticism on both sides, on teachers and on professors of various subjects, with regard to keeping up with the times. It is a more difficult task than one outside of the work is willing oftentimes to admit. For the teacher who has taught several years acceptably, to begin anew to study and to study something that was not taught in the schools when she was prepared and trained for teaching, is no easy matter. It is very difficult for one who is teaching her full time to find time to take up these subjects. Yet in reason we, as teachers, must admit the necessity of this progress, and in a measure we are making it. We need sympathy and help. The day is fast approaching when science will enter into every department of learning. The word, scientist, will in the future, I believe, be applied only to men of the very highest rank, while as now used it is a general term for all interested in the work. We must all use our eyes. I was delighted to hear the professor say that intelligence counts for more than mere information. None of us doubt that, though there have been times when our practices in teaching have been the other way.

Prof. I. P. Bishop—I have been much interested in the discussion. I am one of those who believe that the teaching of all geography should be from the physical standpoint. Perhaps I should go a step farther and say that it should always have a basis of geology, or at any rate, a little geology should form a part of the teacher's outfit.

The first essential in the teaching of physical geography, as in the teaching of anything else, is the teacher. Next to that is a proper amount of time. Laboratory work means extra labor, extra hours in teaching and extra hours and labor in collecting an outfit. With eight subjects to teach and physical geography among them, is it to be wondered at that the teacher shrinks from this extra drain on his energies? His hours of work should be lessened, and he should have freedom to use the kind of knowledge in which his previous training has been richest. My friend, Dr Kales, is a weather man. He studies the atmosphere, is wise in meteorologic lore, has an amateur meteorologic outfit; and, if he were teaching physical geography, would probably give a large part of his time to that subject. His pupils would profit by his knowledge and enthusiasm and become weather observers, much to their advantage. My predilection would be toward the geologic side, because it is one of my recreations to study nature from that particular point of view. Dr Kales uses the atmosphere which he has always with him for teaching material. I use dirt and stones, the pavements and plowed fields for the same reason, that they are always accessible and interest me.

The great principle is to teach nature as you find it and use the material nearest at hand. In the city the teacher is handicapped by the fact that the out-of-doors has been encroached on by buildings and other things. It is very seldom that we have a piece of land near the school which would furnish illustration of relief or drainage. But the country school teacher always has these at his door. A heavy thunderstorm gashes a plowed field with minature ravines and spreads the material out lower down as a delta or flood plain, and you have the model of a river system. That is the best possible laboratory for the child and for the teacher.

I speak of the geologic side as important, because an apparently insignificant geologic cause may account for facts at first sight entirely unrelated to it. A little ledge of hard rock in the bed of a stream makes a fall: this determines the site of a mill for grinding or sawing; a store for selling necessary articles

follows; then a blacksmith shop for shoeing horses and repairing iron implements; the inn, the church and the school become necessities, and we have the village, the town or the city, as time or circumstances may determine.

Thus we see the relation between remote physical causes and existing social conditions. Nearly every small town and many large ones have facilities of this kind, which I believe to be the best demonstration material in the world as far as it goes. The really good teacher will use such means and will gather about him other appliances for making the study interesting. The city high school teacher, who has no such natural advantages at hand, must create for himself artificial substitutes. For him the physical laboratory is a necessity.

Prof. William T. Morrey—I ask my pupils to describe their experiments under the headings 1) purpose, 2) materials, 3) method, 4) results, and 5) conclusions.

1 *Purpose.* I desire to comment briefly on the work and the experiments by and on the classes in physiography in the Peter Cooper high school of New York city.

2 *Materials.* a) *Pupils*, about 150, ages 16 to 17, four fifths girls; little close acquaintance with natural phenomena.

b) *Course* required in third year of those expecting to become teachers, elective by others. Botany, biology and physics have preceded it. Periods, four a week, 45 minutes each, one of four is " unprepared " work. " Unprepared " work, an exercise, an experiment, supplementary reading, or oral or written review, at discretion of the teacher.

c) *Equipment* fair, perhaps much better than the average. We need, of course, many more maps, charts, apparatus, and models; most of all just now we need the Shaler-Davis-Harris models and photographs for physical geography and geology.

d) *Textbook.* Prof. Davis's. Some 50 standard reference works. For supplementary reading and " unprepared

work" copies enough to supply at least a large class with the separate monographs of National geographic society and some of the Cornell nature study quarterlies.

e) *Excursions.* So far we have visited the sidewalk in front of the school and a small outcrop of Tuckahoe limestone in a nearby lot. We hope, of course, to make use of the large parks, the Palisades, the sea beaches, tidal marshes, and the great museum of natural history.

f) The *principal* and the *head of the department* designated the results desired, advised when requested, but generally left methods to the teachers.

g) The *teacher* has tried to keep abreast of new ideas and points of view, and of recent literature without being carried away by them.

3 *Methods.* The text must be understood, principles mastered, illustrative facts learned, and the main things must be drilled in. Examples and illustrations should include the commonplace, the merely local, the state, the national, and then the continental.

Experiments made where unavoidable rather than whenever possible, few rather than many, always as a means not as an end. When in doubt about the value of an experiment or exercise, do not make it, review instead.

Comprehensive *reviews* showing the interrelationship of the various phenomena, in concluding a subject. Articulated skeleton outlines.

The pupils must be prepared to pass a good, stiff examination on their textbook.

4 *Results.* Probably very few pupils will not deserve promotion.

The results of the first three experiments were the poorest because they were assigned for home work rather than class work, because too long a time was given in which to do them, because they were given together instead of separately, and because they may not have been clearly explained, or were in part too difficult. The test of a paper's value was this: could a third person of ordi-

York state, the school board would get a particular answer. If the school board of this city should put the same question, it would perhaps get a different answer. And so it goes. The point is this: what we need is some uniformity, some definiteness. We need something, as suggested by Prof. Davis, in the way of a set of exact exercises. The history teachers in our schools learned this fact some time ago, and, through committees appointed, they have now got down, I think, to a basis of agreement; and so in other departments. I suggest now that the earth science teachers of this association appoint a committee which shall report at our next annual meeting. One of the vital matters touched on in this little syllabus of Prof. Davis's paper is this: the importance of so correlating work of successive years that one shall prepare for the next; that the preparation thus made shall be fully used and built on; and that no unnecessary repetition of work shall be allowed. Without some consensus as to where we are at, this is never possible; till we have a consensus as to the correlation of our work, we shall never get it.

——— I want to say a word about these topographic maps. I remember a few months ago hunting up an office in Berlin because I wanted to buy about five German atlas sheets. They came to nearly $5 if I remember correctly. For about twice that amount I had bought two or three years ago the whole outfit of sheets furnished by the United States survey. Now I do not suppose you are going to buy 1200 or 1400 sheets, many of them very small, but you can take the little pamphlet by Prof. Davis, on the *Use of maps in schools*, with the maps that have thus far been issued for wall study, and have a very good outfit for practical work so far as these maps go, putting them into new folders classified and labeled. I have taken the little manual prepared by Prof. Davis, cut up copies of it and pasted the descriptions at the bottom of the maps for certain uses. Another good scheme is to mount a part of the maps and group a number of sheets that show some important feature. These might perhaps be colored, strengthening the drainage lines or bringing out some other important feature. Another suggestion. When you

have mounted a map, do not hang it up where the pupils will see it all the while. Roll it up when you are through with it and lay it away, bringing it out only once in a while. Make all of them more or less rarities and let them be fresh to the pupils.

I remember spending some time about 11 years ago in the Harvard summer school and listening to Prof. Davis. I was indebted to him that summer for an impression, which was ground down into me so that it stuck, that, in making a geologic section or in diagraming a cross-section, the diversified topography should be preserved and the vertical scale be kept down. I state this here, a little out of place, but I wish to pay my measure of compliments to Prof. Davis.

R. H. Whitbeck—Let me say first that there is available a collection of lantern slides such as Prof. Davis regretted did not exist. Cornell university has between 2000 and 3000 lantern slides very carefully collected, and the authorities of that institution have consented that duplicates of these lantern slides may be sold. There is a man in Cornell now who can supply you with an illustrated catalogue and prices of lantern slides covering practically every topic in physical geography, and will provide you with them at a rate lower than dealers get. This is done by the courtesy of Cornell university to help along a good cause.[1]

The second point is this. There is being prepared a physical geography guide for New York state. Perhaps I am a little premature in announcing this, for I only heard of it a short time ago; but one is, I believe, in preparation. It is intended to be a guide for the use of teachers of physical geography in New York state.

The third thing is that there is a possibility of Prof. Tarr's articles on the physical geography of New York state being collected and published in a single volume; and I would like to make a motion right here to this effect, that Prof. Tarr be encouraged by a vote of this meeting to collect and publish in one volume his articles on the physical geography of New York state.

Mr Whitbeck's motion was carried unanimously.

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[1] Farther information may be obtained by addressing Prof. R. S. Tarr, Cornell university, Ithaca N. Y.

Prof. Davis—It is evident from what has just been said that more advance than I recognized is under way. I hope, however, that, when the catalogue is printed, not merely will these 2000 or 3000 slides be given, but a selection of the best 50 will be made for illustrating geography in the grades and a selection of 100 for geography in the high school. It is desirable that the teachers be aided in selecting from the blue prints by experts. I am sure the teachers would be very glad to have such aid, so that they might say, "Give me the 50 or the 100", rather than have to make the selection for themselves.

Another word in regard to the laboratory versus the field. It does not seem to me that either one can be dispensed with in any locality. The local field, however varied, is not the earth; it lacks many important things, and some observational experience in those other things can be gained best by laboratory work. On the other hand, however good the laboratory, however full its equipment, we can not dispense with the field, because we can never hope to give in the laboratory the training that the field can give.

As to the burden on the teacher. I hope nothing that I have said will imply that I am not aware that teachers are very hard worked; that as a rule they have too many different things to do, too little leisure for study, pay insufficient to enable them to carry on outside work. These are some of the serious difficulties under which education in general labors today; we must recognize them and strive against them. Not only must superintendents, when appointing new teachers, select the very best they can get, but they must also give an opportunity for progress to teachers who are already appointed. A scheme by which opportunity for progress is furnished is actually in operation in the city of Indianapolis in connection with what is there called the Gregg fund. The Gregg fund is some $10,000 or $15,000, the gift of a former teacher in Indianapolis, who on leaving that city went west, and, remembering his former associates, left a considerable sum of money for the benefit of the public schools of Indianapolis. The superintendent there was at loss for a time

to know in what way a sum so munificent could be best applied to the benefit of the schools. After waiting some time, during which the fund accumulated, it was finally decided to apply the income to scholarships for the teachers in the schools of Indianapolis and thus to enable them to go away for half a year or a year for purposes of study. In that way many teachers of Indianapolis have had opportunity of liberal study in colleges and universities and have profited greatly. They are asked in return to pledge themselves to service in the Indianapolis schools for a short period of years. It is curious that so simple and so admirable a scheme as this is found in only one of our many cities. It is curious that, with so many extremely generous givers, this simple scheme is practically unknown. We hear over and over again of the successful man who has come up from the country giving his home village enough from his competence to maintain a free library, for example. But, supposing another man goes out from that village, what shall he do? Might not he give a Gregg fund, the income of which would greatly supplement the efforts of the superintendent in enabling the teachers to improve themselves? A Gregg fund in a country village would in the course of six, eight or 10 years complete a circuit among the teachers. It would be an invaluable aid to teachers and thus of great advantage to scholars.

SECTION D. NATURE STUDY

SIGNIFICANCE AND LIMITATIONS OF NATURE WORK

BY PROF. STANLEY COULTER, PURDUE UNIVERSITY

[Paper read but manuscript not received at date of printing]

SYNTHETIC NATURE STUDY

BY SUP'T HENRY A. KELLY, NEW YORK

Within the last few years nature study has been introduced into the curriculum of the elementary school. It is coming to be recognized as an important factor in the education of young children. The problems which now press for solution are those connected with the character of the nature study and with its educational value, on the one hand; and with its relation to the other

subjects of instruction, on the other. While these can not in reality be considered apart, it will be found convenient to attempt a discussion of them separately.

We have first to decide as to the aim of nature study in elementary education. The object at which we aim in education can not be expressed in terms of the separate subjects concerned. Thus the statement of what we hope to contribute to the child's development by nature study, considered as a separate branch of instruction, must of necessity be narrow and inadequate. It will, however, serve to bring certain peculiarities into stronger relief, besides clearing the way for discussion, if we note the aim as expressed by some of those who have given attention to this matter recently.

In the preliminary report of the committee of nine of this association, printed in the *Journal of pedagogy*, April 1898, it is said:

The specific object of nature study, we think, should be to train children to see, to think, to talk, to write, or in more general terms: first, to get knowledge by the thoughtful observation of real things, and then to express it naturally and correctly. But besides these specific objects, there are others of a more general character and of higher order: to cultivate sympathy with nature and appreciation of her beauties, skill in the use of the senses, and judgment in the translation of the messages they deliver, and finally, above all, to secure a correct attitude of the child mind toward knowledge in general.

The report of the subcommittee on nature study to the committee of nine, published in the *Proceedings* of the third annual conference of this association, November 1899, says:

The immediate aim of nature study in elementary schools is quite different from the object of science in higher institutions. While both nature study and science should train pupils to use their eyes and other senses, and thereby gain definite exact knowledge, and should develop the powers of observation, thought and expression, the teacher of nature study must give attention to the mental interests of boys and girls, and endeavor to quicken their reverence for nature and appreciation of the beauties of the world of sense. Nature should be a means of training our children not merely to see, think and tell for themselves, but to appreciate what is most worth seeing, thinking about and expressing.

In the report of the committee of 10 the aim is thus expressed:

> It must be remembered that the primary object of nature study is not that the children may get a knowledge of plants and animals. The first purpose of the work is to interest them in nature. The second purpose is to train and develop the children: i. e., to train them to observe, compare and express (see, reason, tell); to cause them to form the habit of investigating carefully and of making clear, truthful statements, and to develop in them a taste for original investigation. The third purpose is the acquisition of knowledge.

These are typical of many other expressions on the subject. Their general similarity of thought will be noted, though the emphasis is differently placed. In all, however, the need of interesting children in nature, and of establishing sympathetic relations between the child and nature is recognized. A restatement of these aims may be attempted by saying that the nature study should conserve and extend the child's interest in natural phenomena and the relations existing between them, should develop a sympathetic appreciation of living creatures; and should utilize these interests in forming habits of observation and comparison, in promoting rational organization of ideas, and facility and correctness in artistic and vital expression. Nature study as thus understood includes not only the work on plants and animals, and inorganic nature generally given in the lower grades, but also the study of those more definitely physical and chemical phenomena which may be introduced into the higher grades to enrich the geography work.

With this general aim in mind, and with the qualification already pointed out as to its inadequacy of expression, we may consider what principles are at hand to guide us in deciding what nature study is of most worth. And here we have a choice of two courses—we may enunciate the principles empirically determined by the teacher in the classroom, or we may seek in biologic and psychologic science for some broad generalization. The first course is open to the objection of being unscientific. The principles discovered by it have no necessary validity. We are, more-

over, provided with a scientific generalization of the greatest value, as expressed by Herbert Spencer, " Mind rises to what are universally recognized as its higher developments in proportion as it manifests the traits characterizing evolution in general ", that is to say, mental development from its earliest beginnings is to be recognized as " a correspondence between inner and outer actions." Progress in education, as in biology, depends on successive adaptations of the organism to an increasingly complex environment.

It is a peculiarity of nature study, understood in the broad way already outlined, that it is able to furnish knowledge of a large part of this environment. It is certain that we have not utilized the opportunities offered for a wide contact with reality in a generation which, as Prof. Geddes says, " has been so largely trained to mental activity in presence of the printed or written word, but to mental passivity, if not indeed to complete repose in the open air and in presence of the facts themselves." The fault lies largely with our school training. It is a fault which nature study properly taught can remedy.

But it is not enough that the environment be presented to the pupil; it must be presented in such a way that by successive adapations, or reactions, growth may take place. In a word, mental organization must be provided for, and this can be done only by methods which result in mental synthesis, or in Spencer's term integration. He says:

> After there has been a mental accumulation of facts presenting a certain community of nature (remembered first as isolated facts, and after further experience colligated as facts having some resemblance) there, suddenly, on the occurrence perhaps of some typical example, arises a cognition of the relation of coexistence or sequence common to the group: the particular facts, before loosely aggregated, all at once are crystallized into a general fact—are integrated.

It is, I believe, a fair criticism of much of our own school work, not alone of nature study, that it fails to provide for synthesis of elements—for mental organization, which means power

for development. By this it is not meant to undervalue the importance of analysis and isolation in school work. The first procedure of the mind, as Sir William Hamilton has pointed out, is analytic. Analysis and synthesis are correlative processes and go together. But it undoubtedly remains true that the emphasis is laid on analysis in much of our school work. The teacher, who is an artist, aiming at the development of creative power, needs to appreciate more fully the importance of definite artistic and constructive work. It is here that the failure of the object lesson system, which flourished in the days of a psychology of faculties, comes most clearly into view. No synthesis was possible on account of the widely dissimilar objects chosen for study, the principle of whose choice was merely to provide material for observation and analysis. There is danger, too, in the exclusive use of the laboratory method, which may neglect to bring the facts learned into proper relations. This was clearly shown in the early days of the laboratory method in high school physics.

On the other hand, there is evidence that the importance of a more synthetic mode of treatment in teaching is beginning to be appreciated. A few illustrations will serve to make this clear. Among the broadest educational influences of the day, reaching all classes alike, are those great expositions which have been so pronounced a feature of late years, in this country and abroad. In the development of these great undertakings we are able to note a decided step in the direction of a more synthetic mode of treatment of the exhibits. Without being able at this time to point out in detail the steps in the development of this idea, it must suffice to call attention to the commendation expressed by Prof. Geddes, of the idea of the Swiss village, a side show, as we should say, of the great Paris exposition of last summer. In a recent article in the *International monthly*, he quotes from the guidebook of the village as follows:

The designers have wished to make more than a Swiss village; their aim has been to realize the synthesis of an entire country, to give material expression to a whole nature. They have taken

a hostelry at Lucerne, a house at Berne, a chalet at Brienz, and so on; and they have united, grouped and fused these elements, apparently distinct, but really proceeding from one characteristic and general type. In the same way they have taken here a peak and there a pass, there a grotto and there a rock slide; they have planted the pine, the fir, the juniper; and out of these elements they have made something which is Switzerland as a whole, which sums up its very spirit into this synthesis of landscape, architecture and life; and they have thus made their village the expression of their love and devotion to their native land.

And in commendation of the spirit in which these builders worked, Prof. Geddes says:

To the writer, of whose own life pilgrimage and its resultant ideas this ramble from the Sorbonne to the Louvre, and thence through the exposition to the Swiss village has been a kind of summary, the success of this union of sociology with art appears so complete as amply to justify the apparent paradox of putting this popular show at the climax of a pedagogical scale, of which the upper grades are best represented in the exposition; while the schools and universities are still only at the beginning.

The great museums fulfil more permanently, if within narrower limits, the functions of the expositions. Here the arrangement of material is still largely analytic, but a change in this respect is to be discerned. In biologic collections the organism is no longer shown merely as a dead and ticketed specimen of a certain genus and species, but in relation to its environmental conditions as well. In the American musuem of natural history in the city of New York are cases containing birds and mammals mounted amid artistic and correct reproductions of their environment; here the male robin and oriole are perched on the branch above the nest, while the female is busied below; there a herd of bison roam the prairie, or a family of moose hide in the depths of a northern swamp.

In one room in the conservatory at the Bronx botanic gardens in the same city is grouped a collection of xerophytes from all over the world. Here one sees repeated the various modifications due to the conditions under which these plants are forced

to live. Here are euphorbias and cacti with spiny armature; there waxy blooms and hairy coverings, and reduced leaf surfaces tell the same story of economy in the water supply. In the zoologic gardens in the same park the home environment is reproduced as nearly as possible for the living animal. The wolf has his den in the rocks; the woodchuck ground in which to burrow to his heart's content; the deer and bison great ranges to wander over.

The biologists have found their latest problems in animal and plant oecology, and their interests are reflected in the schools. A comparison of recent high school textbooks in biology with those in use even five years ago, will show how profound the change from the old anatomic and classificatory analyses is. The effort is now to know the organism as a whole, living its life in its own way, and profoundly modified by the conditions of its environment, which themselves have to be understood to understand the organism properly. The oecological and synthetic side of the study is put forward as of first importance. Thus Prof. Jordan, in the preface to his new *Animal life* says:

> The beginning student should know that the whole life of animals, that all the variety of animal form and habit, is an expression of the fitness of animals to the varied circumstances and conditions of their living, and that this adapting and fitting of their life to the conditions of living come about inevitably and naturally, and that it can be readily studied and largely understood.

Prof. Coulter, in the preface to his *Plant relations*, bears testimony to the same effect.

In the elementary school also there are signs that the same leaven is at work. This is seen in the introduction of the term, nature study, in place of the old object lesson, or elementary botany and zoology. The very nomenclature demands the recognition of the synthetic principle, without this the lessons are merely plant or animal lessons. The same principle is beginning to be recognized in the relation which manual training is coming to have to the other school work, and in the correlation of nature

study with manual training and literature. The growing appreciation of the value of excursions to the country, park, museum, menagerie and factory is also a promising sign pointing in the same direction.

It is to be noted in passing that interest in school work is provided for by the recognition of this principle. Here we have to distinguish between interest in the objects presented for study, and interest in investigation, in the discovery of relations, in the synthesis accompanying properly directed mental activity. Children are natively interested in nature, specially on the sides of life and movement, and utility; but, even if they were not, it would still be possible to secure and maintain a high degree of interest in school work in this subject by a synthetic mode of treatment.

So far the attempt has been made to present the arguments for the recognition of this principle from the standpoint of nature study as a separate branch of instruction. But, as has been seen, it is impossible so to consider it for any length of time. The question of the relation of nature study to the other branches is bound to arise. Correlation has sometimes been attempted by synthesis of studies which should properly stand apart. This form of correlation overlooks the value of isolation, and is the form which Dr Harris criticizes in the report of the committee of 15, in which he speaks of the use of DeFoe's *Robinson Crusoe* for reading, arithmetic and geography lessons, as follows: "If the material for other branches is to be sought for in connection with the literary exercise, it will distract attention from the poetic unity. On the other hand, arithmetic and geography can not be unfolded freely and comprehensively if they are to wait on the opportunities afforded in a poem or novel for their development." Time is lacking for the discussion of all the points which might arise in the application of this principle, but in general it may be said that nothing should be considered in the way of correlation which interferes with the free development of nature study along the lines already suggested. That the subject is given a place in an already overcrowded curriculum

suggests that it has its contribution to make to the development of the child. The union between nature study and the other branches of instruction should be symbiotic, not parasitic. Specially productive of good results, it may be said, are the relations established in some schools between nature study and literature in the lowest grades, between nature study and local history and geography in the intermediate grades, and between nature study and geography in the higher classes.

The other form of correlation which results from the synthesis of controlling ideas, within the limits of a single subject, is the form which has been insisted on throughout the greater part of this paper. In the biologic branches, this synthesis may be brought about through the unifying power of modern views of organism, function and environment; in geography, itself a complex, unity may be secured through recognition of the relations of human organization to environmental conditions.

The principle of synthetic treatment has already been shown to have wide application beyond the limits of the elementary school. It is to the high school and university, building on the firm foundation of the lower grades, that we must look for its more complete development. Each onward and upward step in our education brings wider vistas before our view—what before we saw in the valley as unrelated elements in a sequence of time and space, seen from the hight are blended into one landscape, each separate part softened by the distance and brought into relation to the whole. The trees under which we played as children, the minerals, or insects, or plants which we collected, studied and exchanged in our youth, were all so many separate worlds to us then. If we see them now with the eye of a true student of nature, we appreciate them no longer for ourselves alone, but for the light they can throw on the great problem of man and his relations to the universe.

What seemed the parallel lines of our high school work in the sciences, in mathematics, in history and in literature, are in adult life seen to be focused on the same problem. And this is the final word—to this it must come in the end, that all our science

work from the nature study of the elementary school to that other nature study of the high school and university, must aim to contribute its store of related facts, to the end that the aim of education may be realized in better equipped human beings, better morally, esthetically and intellectually. Science is not a collection of scraps of knowledge, of informational odds and ends, but, as Geddes says, "a rational presentment of our facts as a living and dramatic unity, as an historic and organic growth, as an unfolding from simple to complex."

Prof. J. H. Comstock—When I read in the program the title of this paper, it roused my indignation and wrath. The idea of synthetic nature study is a red flag to a university man. We who were pioneers in this work and led the early struggles with its difficulties, soon came to an understanding that pupils of nature study should be given but few things. Prof. Jackman, in his book, carries the matter to an extreme, and attempts to teach the rudiments of all the sciences. The child's mind is not synthetic. Prof. Kelly's paper was an excellent and instructive exposition of oecology. I am pleased to find that we are in such hearty accord.

Prof. Stanley Coulter—I find that we are in unison in our ideas and differ only in the expression we have given those ideas. I object to a formal method and also to a course of study in nature work.

Inspector C. N. Cobb—The teacher who has determined to accomplish definite results will employ the right method naturally.

I believe that nature study can be related closely to the literature work and make the study of poems and of prose writing more interesting and full of life. The pupils can not be held closely to a definite course. It is distressing to the children. The teacher should follow the interests of her class in her selection of topics for study.

Prof. H. A. Kelly—I alluded in my paper to the work which is done in many schools in teaching *Hiawatha*. The pupils read the story and at the same time study the plants and animals which are mentioned in the poem.

GENERAL SESSION—SYMPOSIUM

COLLEGE ENTRANCE DEMANDS ON THE SCIENTIFIC STUDENT

Prof. C. W. Dodge—We are somewhat delayed in beginning the session; but we are having so many good things this afternoon that I am not at all surprised that you wish to linger over them longer than the program requires. Among other suggestions which came in for topics of discussion at this meeting is the one on the program, on which we expect to have four or five addresses from three to five minutes long. The topic is, "What does the college instructor want the scientific student to know and to be able to do when he enters college?" These speeches are quite impromptu. Several gentlemen who have consented to speak have hardly had opportunity to get the topic in mind. After one or two announcements we will begin what has been called, for the lack of a better name, a symposium.

I suppose there is no one science in which preparation is required that compares at all with physics. If any scientific work is required for entrance to college, it is almost certain to be in physics; and Prof. Nichols of Cornell has generously agreed to start the discussion by telling us what he at least would like a student to know in physics when he comes to college.

Prof. Edward L. Nichols—No other pedagogic topic relating to entrance examinations has been quite so thoroughly thrashed out as this one, of the physics requirement for college; so much so, that I feel very sure that I have nothing to add to what has been already, if anything, too explicitly stated in various circulars issued by the National educational association, by this association, by the Physicists club of New York and by the regents. There is no division of opinion on this subject. When we attempt to discuss it, we are all of one mind, so that it comes down to such trivialties as whether the duration of time to be devoted to laboratory practice should be 40% or 45% or 50% or 55% of the total —a question which can not be answered in percentages exactly, but has to be solved by each school for itself in accordance with

Prof. Frederic S. Lee—I received the invitation to speak in this discussion only a few minutes ago, and in a moment of weakness I consented. I realize now that the subject is one about which I know very little from experience, since my work is almost entirely with graduate students. I might say, however, a very few words. In the first place, physiology as taught in college must necessarily, from the nature of the subject, be largely physical and chemical; hence a knowledge of pure physics and pure chemistry is quite essential to its proper study. Secondly, the college physiology ought not to be simply human physiology. It should be broader than that. It should be a biologic physiology. Hence some knowledge of the elements of biology, of zoology and botany, is also quite essential to its proper study. In the college, I would prefer to see physiology placed after physics, chemistry, and general biology. But this is not always possible. Where it can not be done, it is necessary that the student shall have studied these branches before entering college.

Regarding the question of physiology in the secondary schools as precedent to college physiology, I feel, as doubtless most college teachers here feel, that I should prefer to take a student who has had no training in this science. My special reasons are these. I do not wish to repeat my paper of the afternoon; but one or two things which I tried to point out are that the secondary school physiology is almost entirely a training in *human* physiology, and a training in the physiology of *organs*. I think this is a great mistake. From such a course the student gets a narrow and incorrect idea of the scope of the science of physiology; and many students, if not a majority, become prejudiced against the subject. I would rather take a student who was absolutely untrained in it, who knew nothing whatever about it, than to take one who was prejudiced against it.

To sum up my views, then, it is very desirable that the student who is to take physiology in college shall have taken in the preparatory school physics, chemistry and general biology, or zoology and botany. A broad preliminary course in physiology itself is not undesirable; but, if the preliminary course is to be narrow, I should prefer to have it omitted.

Prof. Stanley Coulter—[Manuscript of remarks not received at date of printing]

———Are we to understand, then, that we ordinary teachers of physiology had better expend as little time as possible on the subject of physiology?

Prof. Lee—I can hardly agree with such an extreme wording of the nucleus of my thoughts.

Prof. William Morris Davis—In answer to the question, "What does the college instructor want the scientific student to know?" my first point is that he should know how to work. It does not seem very material how he has learned to work, provided that he has really made some substantial progress toward that invaluable end. The second point is that, if he is bent on scientific study, it is well that he should have made some beginning in that sort of study before coming to college, and this beginning should have taught him to see what he looks at, to record what he sees and to think about what he sees and records. Knowing science is impossible without some knowledge of how to work in science. Truly, certain scientific facts may be learned, but they remain mere empiricism if they are not learned by scientific methods. There must be opportunity for observation, involving keen and discriminating eyesight; for expression, involving careful and accurate writing in simple and correct language, as well as effective though simple drawing; and for reflection, involving the various faculties of generalization, invention, deduction, comparison, and judgment. None of these processes need be of an advanced order, but they should be sincere as far as they go. Their value is best judged by the student's capacity to undertake work of a similar character rather than by his capacity merely to repeat what he has done or by his memory of itemized statements: hence college examination papers as well as courses of school study may need revision. I can not understand why any college instructor should object to preparatory training of this sort for his students: indeed, it seems as if the objection to preparatory scientific study that has been made by some of the previous speakers this afternoon were based chiefly on the assumption that such preparation must be bad; the sort of prepara-

tion, for example, that makes a beginner think that he knows the whole of a science, that there is nothing more to learn about it because he can recite a few of its results. It is difficult to see what objection can be urged against sound preparation of any kind. Why is it that the professors of languages and of mathematics wish that their students should have some preparation in those subjects, even though the preparation is sometimes bad? It is because languages and mathematics are well taught in good schools, and on the beginning there made, higher work can be done in college. The same is true in physics. That subject has now been carried to a point where it is effectively taught in good secondary schools; and college professors are, I believe, satisfied that it is a wise arrangement by which physics is placed within the reach of young students. Let us therefore urge that several sciences be included in the curriculum of the better secondary schools, and be accepted in the requirements for admission to college, so that those whose inclinations are scientific shall have as good an opportunity in subjects that attract them during their school days as those whose preference is for language and history; and this brings me to my third point, viz, that, if the scientific student comes to college well taught in one or more sciences, we are sure that many students who never come to college have also had opportunity of studying well taught elementary science, and that is a good thing. Indeed, it is so good a thing that it is my chief reason for desiring an opportunity for scientific preparation for those fewer students who do go to college. This may not be properly part of an answer to the question we are here considering, but, inasmuch as it is very generally agreed that the work of students who go to college must on the whole conform to the school curriculum that is prepared primarily for the much larger number of students who do not go to college, it must be admitted that all parts of this problem are so intimately combined that no one part can be determined without due consideration of the others.

My fourth point touches the particular kind of scientific preparation that would be profitable for my students in physical

geography. It would be entirely agreeable to me to find newcoming students already well prepared in the elements of physical geography. For then, if they desired farther study of the subject, they could soon go on in college with the physiographic study of the United States, and afterward with the study of Europe, and so on. But it must be avowed that my chief reason for wishing that some students should come to college with a sound knowledge of elementary physical geography is already presented under my third heading; viz. that many others than the few who go to college would then have occasion to learn something substantial about a subject that they will be glad to understand a little as they grow older and see more of the world. Certainly we have no intention of requiring elementary physical geography of all comers, nor even of those who wish to take up the subject in college. We shall continue to offer a physiographic course to beginners. If any one scientific subject should be required, physics seems to me on the whole to have greater claims to that position than anything else.

It would seem sometimes that a question of the kind we are now considering obscures educational problems instead of clearing them. In this case, for example, it is implied that substance and not quality, that knowledge of fact instead of capacity for work, is desired by college teachers. For my part, capacity for work is much to be preferred. I had much rather have a student who had really learned how to study Latin and Greek than one who had shiftlessly "studied" physical geography from a poor textbook under an incompetent teacher; but, if he has earnestly studied physical geography in text, laboratory and field under an inspiring teacher, so much the better. So we go back to the beginning. What I want a scientific student to know is how to work, specially to see, to record and to think.

Prof. I. P. Bishop—That the subject of physics is better taught than some others is because of the efforts of this organization to outline clearly the amount of matter to be taught and the general manner of teaching it. One effort of this symposium should be to ascertain whether biologic requirements have been as sharply defined as those in physics. If the college will state definitely and in detail what it wishes, I believe the secondary schools will bring their work up to the required point.

Friday evening

THE SCIENTIFIC BASIS OF MODERN INDUSTRY

Dean J. B. Johnson—When the anthropoid creatures, which we are now content to regard as our primitive ancestors, became so highly developed intellectually and manually as to provide for themselves tools of defense and offense, we may well say that then and there they became man, whatever their size, shape, form, or habits of life. Man is the only tool-making and tool-using animal. And throughout all history material and intellectual supremacy has always accompanied the people who devised the most efficient tools. But till James Watt so greatly improved the steam engine in the last quarter of the 18th century, nearly all the power employed in the world to that time had been animal power, and a very large proportion of this was man power. For untold centuries man was but a hewer of wood and drawer of water; a slave and a drudge; a creature to be used, and used up, when friendly and capable, but to be slain or allowed to die of neglect without compunction when unfriendly or incompetent. With the advent of steam as a motive power, in which one ton of coal will do as much work as a man can do in eight years, man ceased to be primarily a motive power and became a director of such power. The laboring man now very largely ceased to be a mere muscular brute and became a reasoning and inventive director of nature's forces to his own great and rapid intellectual development. Since the annual production of coal in the United States is now 240,000,000 tons, and this is very largely consumed in the production of steam power, we may say that the power thus created in the United States every year is as much as the utmost power which all the men in this country could develop if they were all set at hard labor continuously for 10 hours a day for a century. The improvements which have been effected in this one tool, therefore, have not only lifted the most degrading servitude from mankind, but have multiplied man's powers many hundred-fold. The application of this new power to manufacturing on a large scale, and to land and water transportation in the 19th century, has now so revolutionized the

material interests and vocations of the race in all civilized countries as to plunge us headlong into a new world, in which we have not yet found our bearings. Truly, old things are passed away and all things have become new. Is it surprising that there are now so many misfits in the institutions of society, or that there are so many vain attempts to stem the tide of revolution and progress which many persons fear is about to engulf the world? Indeed the problems of adaptation to the ever recurrent and rapidly succeeding new social conditions are by far the greatest which have ever come before the mind of man for solution, and they demand of every intelligent, thinking person, his very best thought and time and strength.

By modern industry, therefore, we mean the entire productive activities of all civilized nations; for in all these man power and horse power have now been almost wholly replaced by steam, water and electric power, and these are being employed in ever larger and larger units. And ever the new adaptations of mechanical means to what have hitherto been purely manual employments come more and more rapidly and in increasing numbers, so that what was done but yesterday by hand only, in scores of employments, is today done by mechanical means, in which the brain only of man finds exercise.

Perhaps it would be as well also to define science, though that would seem to be hardly necessary in an audience composed mainly of the members of an association of science teachers. The word, science, has, however, been so greatly abused of late that it seems necessary often to re-define it. Among the many definitions of this word I will choose one of the simplest, and say that science is organized and correlated knowledge (with emphasis on the knowledge).

Most persons seem to think that a science may consist of organized or systemized anything. Thus astrology, alchemy, palmistry, phrenology were all in turn regarded as sciences, but are so regarded no longer. These all consisted in organized or systemized coincidences, assumptions, and theories, and we are not wanting in many modern systems of belief, quite as fanciful and

groundless as these, but which are parading in the garments and adopting the terminology of science. That can not be knowledge which is not true. Science includes, therefore, only what is known to be true. We do not yet speak of the science of evolution, but of the theory of evolution. But, you say, if I am firmly convinced of the truth of the fundamental tenets of what has been called the theory of the evolution of the human race, why may I not speak of the science of evolution? This suggests Pilate's query, "What is truth?" I admit that in nearly all human affairs, so-called truth consists in the highest attainable probability. When one thing is to us more probable than any other alternative we can think of, most persons would say I believe this to be true. This may serve very well as something on which to base an opinion, if we must indulge ourselves in such luxuries, but it hardly answers the demands of science.

Again, we must distinguish between qualitative and quantitative truth, or science. To say that all matter is mutually attractive is to state a truth, and a scientific truth, but it is a truth we could do nothing with. It is qualitative only. But to say that all bodies attract each other with a force which varies directly as their masses and inversely as the squares of the distances between their centers of gravity, is to state a quantitative truth which can be used as a tool of investigation and analysis. This is the law of gravity which Newton discovered. By sitting under a tree and noting the fall of the apple, a hoary myth which we must now treat with the deference due to its age, Newton might have concluded that there existed a force of attraction of the earth for the apple which the strength of the stem was no longer able to resist; and, while this force might be called gravity, the conclusion would not establish a law in accordance with which gravity always acts. But it was the law of gravity which Newton conceived, and which he proved to be true by showing that it and it alone could explain the revolution of the moon about the earth.

On the other hand, scientists are constantly challenged by their literary friends to explain the essence of things as well as

the laws in accordance with which the essence manifests itself. Thus they say, What is this force of gravity you talk so earnestly about? What is the medium known as the impalpable ether which pervades all space and which transmits this light and heat without absorbing it? What is the mysterious life principle which causes every plant and animal form to reproduce its kind with such marvelous exactness, times without number? And finally what is the mind itself and where does it reside? From whence came it and where is it to go? These and an unending series of like questions we can not answer, but must we hence admit that there is no science of these things? By no means. While we freely admit our ignorance as to the essence, we boldly proclaim our knowledge of the laws of being and of the manifestation of these secret substantial and spiritual forces. And this is quite enough to know, for most practical purposes. So rapidly as the knowledge of a subject can be generalized into laws, therefore, it becomes scientific, even though there remain whole realms of unknown and undiscovered truth still enshrouding the same subject-matter.

This new knowledge is now coming to us with marvelous rapidity and from sources which increase in number in a geometric ratio. This scientific knowledge has been turned also to such practical account in a thousand ways, and miraculous marvels follow each other in such rapid succession that the average man finds himself dazed and his reason almost dethroned by daily observing the accomplishment of what but yesterday he had thought impossible. He is like Alice in Wonderland, quite ready to believe any improbable thing, if it only wear the garments of science. In this way only can we account for the extreme credulity, not to say gullibility, of this the greatest scientific age the world has known. To the average citizen all things are possible, and only await the coming of the scientific magician to discover the trick by which the thing may be done. The very language employed in describing the latest fake, if it be only an unknown tongue, will be accepted and adopted as properly accompanying the hitherto unknown forces or laws. In fact, the

greater the fraud, and the more mystifying the language, the easier it is to deceive the wary capitalist. From these facts we should conclude that the greater the possibilities of a given agency, the greater the necessity to determine its limitations. But the determination of the limitations of a force, or medium, or style of mechanism, demands the highest knowledge of both the related sciences and of the mechanical arts involved. There are, however, certain generic truths which have been established, that serve to define these natural limitations in many cases. For instance, the discovery of the laws of the conservation of energy and of its transformation into heat and back again, serves at once as a royal road to intelligent designing and as a great Chinese wall of limitation about a host of mechanical problems which formerly were considered unlimited. In accordance with this law, energy can not be created; it can only be transformed; and hence, any mechanism which promises to give back to us more energy than we feed into it, is known in advance to be a delusion and snare, and no scientific man would care even to try an experiment with such an appliance. While the scientific method is that of experimental verification, there are some experiments which may not even be tried.

With this review of the present scientific status, let us examine its bearings on the field of modern industry. Here, on the threshhold of the world's workshops, we are struck at once with the magic transformations which have been effected in the methods of production. The skilful mechanic, who with great manual dexterity and with a complete knowledge of his art, fashioned a product from the raw material to the finished state, is no more. His like is no longer found outside of Asia. These workers who entirely made up the gilds of former centuries, and who were the pride and glory of Europe in the renaissance, were first reduced to the performance of single manual operations, the complete product being then the work of many hands, and finally, with the introduction of the automatic and labor-saving machinery of today, they have become mere overseers and tenders of such machinery. As we walk through any great modern factory, therefore, we

see not manual workers, but machine attendants. But let us not make the very common mistake of supposing these men and women, or boys and girls, to be mere automatons, or animated attachments to the machines they operate. This is the mistake our literary and clerical friends nearly always make. They deplore the age of steam, wind, water, and electricity, and of labor-saving and automatic machinery, and sigh for the good old days when the blacksmith was the only worker in iron; when the wheelwright and the cabinet-maker did all the work in wood; when the shoemaker and the saddler were the workers in leather; and when their grandmothers had added to their other labors the spinning, weaving and making up by hand of all the family wardrobe. These workmen, by laboring from 12 to 16 hours a day, at small wages, managed to earn only enough to provide the bare necessities of life. With bodies worn out with hard labor they came home to rest, like beasts of burden, or resorted to the alehouses to stimulate their weary frames, and so were often transformed into beasts of prey. This exhaustive, slavish toil was deadening to all intellectual life, and it has always greatly handicapped the most aspiring and enlightened souls. But the steam engine and multiple production have changed all this. Not only has the slavish muscular toil been lifted from off our industrial workers, but the wearing and anxious care formerly placed on all such workers in order that they might bring their work up to the requisite standard of exactness, has also been taken over by mechanisms which not only never tire, but which will turn out a million pieces exactly alike. The attendant on such a mechanism, charged only with keeping it in order and well supplied with raw material, has time and opportunity, yes, and the necessary stimulus, to engage in profitable study and invention. The very complexity and the marvelous ingenuity displayed in the machine itself are a perpetual challenge to the operator to comprehend its construction and to improve its accuracy or its output. In place of a more or less degrading physical toil, we now have for these workers a most wholesome combination of physical and mental exercise, which is peculiarly conducive to mental self-

improvement in the workshops and also when the day's work is over. The shop conditions were in fact never so favorable to mental effort out of hours as they are today, and the industrial worker was never before so well provided with self-helps. Through our correspondence schools, our periodicals and our public libraries, it is entirely within the reach of all such workers today to obtain a very good scientific, technical, or literary education, and, if they do not choose to avail themselves of such opportunities, they should not for that become objects of a misplaced sentimental commiseration.

But you ask, how has this wonderful industrial revolution been wrought? How comes it that the 19th century marks a far greater industrial progress than all the untold previous centuries combined? By what newly discovered species of magic has the world been so transformed that our revolutionary fathers would not recognize the planet, if they were allowed to revisit it, but would insist they had been transported to some other celestial sphere? There can be but one answer to these questions. The industrial revolution is but one of the many fruits of the scientific progress of the century. The sciences here involved, also, are those relating to inanimate matter. Mathematics, physics, chemistry, mechanics, geology, mineralogy, metallurgy, these in their multitudinous ramifications have, in their applications to the arts, transformed the world. While chance, or accident, or a blind empiricism has often led to important discoveries and inventions, the successful development of industries based on these is always a matter of the scientific application of means to ends. As a rule, however, the scientific laws and principles have resulted from long and patient scientific research, on the part of pure scientists, and the industrial utilization of these has been gradually developed by a class of men whose peculiar business it is to bring the materials and forces of nature into the service of man. These men are known as civil, mechanical, electric, mining, and chemical engineers. The discoveries of our pure scientists, followed up by the inventions of mechanics and engineers, have together wrought these wonderful marvels. And, as the

prevalence of science teaching has brought a progress of science which is ever at a swifter pace, so the now widespread technical instruction in this country is bringing our industrial progress along by leaps and bounds. The cheap and quick transportation of goods, by both land and water, has now made of the whole world a common market place. This makes competition universal and the most economic production a necessity to continuance in business. But the greatest economy of production in any line is only attainable by the most scientific methods. The prevention of wastes, the utilization of by-products, the saving of labor, the increase of the output, the perfection of workmanship, the purity of the product, are scientific and engineering questions which find their most successful solution in that country in which is to be found the greatest number of pure and applied scientists. Scientific and technical education is today the foundation of all material prosperity. The more extended and thorough such education is, given to the youth of this generation, the more prosperous will be the generation to come. Bismarck saw this clearly when he said, "Wer die Schule hat, hat die Zukunft." Germany has been acting on this policy for the last 30 years, and her recent marvelous industrial development, without either foreign dependencies or natural resources, has been made possible only by her vast system of scientific, technical, trade and commercial schools. While the German technical colleges have hitherto ranked decidedly below the universities in privilege and in public esteem, a year ago, at the centennial anniversary of the great technical school at Charlottenburg, Berlin, the Kaiser proclaimed that hereafter the technical colleges of Prussia should rank equal to the universities, and would be allowed to grant appropriate doctor's degrees. This practice is sure to be followed very soon in all the other German states. Thus even in classical Germany applied science has now received a just recognition, and the engineer can now wear the much coveted title of doctor, as well as his university colleagues. Heretofore, while a man might do all his work in the technical school, he had to go to the university to get his degree.

While the new census reports on our manufacturing interests are not yet available, I have been informed that in industries in which chemistry controls the product there is now invested in the United States over $5,000,000,000. The next century will be known as the portland cement age, since nearly all classes of structures will be made of it; and we have increased our manufacture of this, a purely chemical product, in 10 years, from 240,000 to 7,500,000 barrels a year, and we will soon be shipping it to the ends of the earth. Five years ago American portland cement was discriminated against, and men who considered themselves experts in this field openly said we never could compete with Germany in this product; but now the Germans are sending to this country for our newly improved cement-making machinery, the superiority of the American product is everywhere acknowledged, and an American chemist is the highest authority in the world on the subject.

In Milwaukee (Wis.) are two steam engine manufactories which have held in turn the world's records for economy of performance, and one of them has no rival in the world for the largest types of steam machinery. Even in the small inland town of Madison (Wis.) we have two factories, one of labor-saving machine tools and the other of electric machinery, which send their products to all parts of the world. There is no doubt whatever, that, if we live up to our opportunities, we shall become the great manufacturing center for the whole world.

And now a word as to the type of man who is our main reliance in this industrial evolution. It is not so much the pure as it is the applied scientist. The discoveries of the pure scientist are common property the world over. We can avail ourselves of a scientific law discovered in Germany as well as if it had been announced from Harvard or Cornell. But to utilize these laws and discoveries in actual industries requires an applied scientist to be on the ground. It is the engineer, or applied scientist, therefore, to whom we must turn in the progress of our industries; and hence I will now consider what qualities and accomplishments he must possess, in contradistinction from the pure scientist, in order to meet fully the requirements of the position.

To the applied scientist that only is good, or is prized, which can be shown to be capable of serving useful ends. It is his business to select from the pure scientists' store of universal truth such as he can use for particular purposes. The pure scientist is to the applied scientists what Columbus was to the Pilgrim fathers. Columbus was bent on discovering a world, or at least a new way to a practically unknown world, while the Pilgrim fathers came to set up for themselves and their children homes where they would be freed from religious persecution—a purely specific and utilitarian end. And yet the results of this specific utilization of Columbus's discoveries have been so great and fraught with so much good and happiness to the world that we are apt to forget the primary discoverer in our gratitude to the men and women who made so specific use of his great and universal achievement.

Our applied scientist must have free and intelligent access to the great storehouse of established truth. He must be a scientist at secondhand. He must not only follow the progress of science in one field, but in every field in which he undertakes to practise. He must therefore be a constant student. This intimate knowledge pertains not only to the laws, the powers, and the forces of nature, but to materials as well. In fact the amount of scientific knowledge required of him to answer to the description we are now making is something quite beyond the ordinary notions of adequacy. It is not gained in a four, or five, or six year course in college. The young man who thinks he has finished his theoretic studies when he has left college can not be included in this category. This breadth of information even the pure scientist does not have, for he is of necessity a specialist.

Our applied scientist must know also how to do things. This is the knowledge the mechanic has. In learning his trade, he has learned the fruits of the world's experience in doing things; learned to do a specific class of things in the best possible way. So, before our applied scientist can decide what is to be done or what is the best way to do it, he must have a large knowledge

of mechanical methods. This knowledge the pure scientist does not possess.

Again, he must know what needs to be done. To know this, he must be a man of affairs. He must be acquainted with the ways of commerce and trade, both at home and abroad; must foresee the needs of the immediate future; must know the difficulties and hindrances of present methods before he can determine whether or not it is worth his while to invent new ones. In fact, he must know as much as possible about how the world now does its work, if he is to facilitate matters. This kind of knowledge also the pure scientist does not possess.

Here are three fields of knowledge, therefore, with which the applied scientist must be familiar. He must have a knowledge of a wide range of scientific truth, must understand mechanical methods, and he must know the ways of business and of the industrial world.

But what else must our applied scientist have and be? He must have largely developed in him that *sine qua non* in the profitable solution of all new problems—invention. This seems to be one of nature's gifts. It can be cultivated, however. If from early youth one forms the habit of thinking up new ways of doing things, seeking perhaps for those extremities which necessitate invention, preferring to work with poor tools or none at all in order to see what can be done in some new and untried way, tinkering up toys or making new ones; in these and in a thousand other ways a boy may foster and develop the inventive faculty. It is this faculty which suggests the various possible ways of accomplishing a given thing. From his knowledge of affairs our applied scientist sees what needs to be done. His invention suggests a hundred ways to do it. It unconsciously runs to and fro throughout his mental storehouse of acquired facts, both of science and method, and brings to his attention all the possible ways of accomplishing the result. The reason sits in judgment on this troop of suggestions the fertile invention has marshaled, and selects the one which will best accomplish the end in view, when all things are considered.

Thus, we see, our applied scientist is at once a student of science, a mechanic, a man of affairs, and an inventor combined in one. Nothing short of this will fill the bill. Being a scientist only, he knows not what to do or how to do it. Being a mechanic only, he knows particular ways of doing a given series of things, and he is sure to give you of his little store, whether it serves the purpose or not. Being an executive man, he sees what ought to be remedied, but knows not what to put in its place or how to accomplish any desired end. He probably gets a "practical man" to come and do something, but the chances are very much against this something being the best thing, or the one thing which should have been done. Being an inventor, without the knowledge of either the scientist or the business man, is indeed a misfortune. Our patent laws are a curse to this class of martyrs. A very large proportion of the patents applied for are inoperative from the transgression of fundamental laws, and of the operative ones, perhaps $\frac{9}{10}$ are worthless from there being no demand for the device. Such men waste their lives and their fortunes and that of their credulous friends in their lifelong labor of inventing worthless appliances for doing useless things. They are a burden to their families and to society; for somebody must support them in their profitless and expensive gropings in the dark.

To fit a man for this high calling our technical schools are established. They put a young man in the way of becoming what we have here described. He there learns the elements of a series of sciences and their applications, which it is absolutely necessary for him to know. If this training be preceded or accompanied by a considerable amount of laboratory and shop practice, such as is now given in all our leading engineering schools, and if he also spends his vacations at such work, he learns something of the practical applications of scientific knowledge and of the mechanic's art. Supplementing this with a knowledge of the business world and of men, cultivating a pleasing address but schooling himself to the strictest honesty of motive and act, both with himself and toward others, he becomes

favorably known. If, in addition to these, he remains a constant student, and possesses a sufficient amount of invention, he should ultimately become the applied scientist *par excellence;* such a man could safely be consulted in the solution of new problems, and this is the special field of the applied scientist. The duplication or copying of old methods or appliances is the work of the mechanic. The solution of a new problem by the ignorant inventor will bring a long and expensive line of failures, and, if success is reached, it is a sort of happy accident. But our applied scientist should be able to find the successful solution, if there be one, and know before he embodies his ideas in wood or metal or stone that his project will be a success. The mechanic or the inventor must first build and then operate before knowing. The man who makes the scientific application of matter and force to particular needs his exclusive business and profession should know even before trying whether or not his method or device will perform its work. But he is not only called on to make a mechanical success, it must be economic success. If it does not pay, it is still a failure. He must foresee all ordinary mechanical and industrial contingencies before he becomes a safe adviser. With such men to lead, our industrial progress is marvelous. For such men the world has infinite needs, and they can command inexhaustible capital. But, alas! we have not enough such men. Too few men who can at once see a new thing to be done, devise the best possible solution of the problem, present it to the world by convincing arguments, and carry the project to a successful and profitable issue. These are large men indeed. We have hordes of smaller men who can execute projects when once devised, but few who can safely be trusted to devise original solutions to new and untried problems. Success is usually attained after a long line of failures. In fact, it is commonly taken for granted that this must be so. But I believe the day is approaching when even initial failures will be regarded as a professional disgrace, and when we shall have many men whose business it will be to solve new problems in the applications of science with as much certainty of success as if they were problems in mathematics.

When we see what miracles have been accomplished in a single century of scientific applications, largely by a system of blind experimenting and repeated failures or of only partial successes; how we have imitated the great motor of the solar system and remade the world through the agency of heat; how we have obliterated time and space on this little earth and made our antipodes our neighbors; how we have brought near the far-off desert and made it to blossom and bear fruit and so have doubled the size of the habitable world; how "the continuous woods where rolled the Oregon, and heard no sound, save his own dashings," now teems with busy life and resounds to the hum of wheels and the joyous cries of happy children; how the thought, inspiration, discovery, or learning of one is multiplied a millionfold by the press and at once becomes the common property of the world; how the hours of labor are shortened so that all mankind may enjoy sufficient leisure to become learned and cultured if they will; how the comforts of life, which formerly could be enjoyed only by kings and princes, are now available to every industrious citizen; how the causes and sources of disease have been discovered and largely eradicated so that sickness is today almost a crime; when we ponder these marvelous achievements of one short century, mostly by a crude empiricism in applying the discoveries of science, what may we not hope for from the endless future with an intelligent direction given to the labors of those who seek to garner the fruits of all science and not only to know the law, but to control its operation, to harness the very laws of nature to the car of human progress?

Such are the achievements of pure and of applied science in the past, their opportunities in the present, and their responsibilities for the future of industry and commerce. The men who give their lives to the promotion and the application of these agencies are genuine benefactors. They are remaking a world. And, while material progress and prosperity are not the highest good, they bring the conditions which make the higher life possible. You can not develop a man spiritually till he is supplied with the comforts of life and has leisure in which to cultivate

the spiritual graces. Thus the most effective missionaries ever sent out from the civilized to the barbarous are the civil engineers. These bring about ameliorating physical conditions, the ultimate consequences of which can not be foretold. They certainly are not altogether physical and material. They are the foundation on which may be built great social developments and spiritual evolutions. Furthermore, the very life of modern industry itself finds its sustenance only in the continual adaptation of new scientific truths in ever new and improved processes and mechanisms. To fall behind in these ever new adaptations is to invite certain inanition and final industrial death. The race is, and will hereafter ever be, to the most scientifically competent and to the most ingenious adapter of scientific knowledge to human needs. Let us also not be afraid of too much material prosperity; we are learning the generous uses of wealth. Wealth is more and more being turned into the channels of popular scientific and industrial education, and this education in turn leads legitimately to greater wealth and also to a greater interest in the high things of this life and to lessening interest in the selfish, and sensuous, and fashionable, and frivolous, and idle amusements of life. In fact, this education in the physical realities of life is the only form of education which will win the interest of the man of business and of affairs as against the counter attractions of money-making and money-spending. When the passion for yachting and horse racing has been supplanted by a passion for developing the resources of nature, and for discovering new truth and applying it to the ever increasing needs of modern society; when the love of personal display and the desire to excel one's neighbors in a vulgar show of wealth have been supplanted by a love of the true and beautiful in nature, which leads of necessity to a higher appreciation of the true and beautiful in life; when, in short, the lower, narrower and more selfish interests of the wealthy class have been replaced by those higher and more altruistic interests which come only with a broader education along lines which appeal to their natures and their tastes, then and only then, will wealth become a fruitful means

to righteous ends. In such hands there can not be too much wealth. In that day it may be hoped there will be no idle rich, and that wealth will be used and not abused. In that day a thousand experiments may be tried in the search for new truth, or for new adaptations of established principles, which now remain as dreams and possibilities only in the minds of our pure and applied scientists. It is only by the concentration of great wealth in the hands of individuals that it may be turned into the channels of scientific benefaction and of profitable discovery where the cost of the investigations is great and also the outcome uncertain. By encouraging in every way, therefore, a general diffusion of knowledge of pure and applied science, we may hope not only to bring to our people a vast increase of wealth, but may we not hope that this wealth will then lead mainly to lives devoted to higher purposes, which will lead in turn to a greater dissemination of sweetness and light, and love, and benefaction, and happiness, and truth, and righteousness? Of these things there can never be a surplus.

Prof. R. H. Thurston—The citizen, his schools, his industries, his life, is a sequence which primarily interests us all, not simply in the capacity of teacher, of organizer of schools, or administrator of the system of public education and training of citizens for the future and for life, but—and so far as it is a matter of personal concern, perhaps mainly—through our vital concern in our own lives, in our children's futures and in the coming century in its influence over the lives of our nearest and dearest. Every thoughtful man perceives that, as the development of modern civilization progresses, the individual becomes more and more controlled and confined by his environment, and the necessity of early preparation for fitting himself to that environment and taking advantage of every change marking that evolution becomes more serious, more vitally imperative. Our parents might roam the continent, and somewhere each might find an environment within which it was possible to make himself safe without being compelled to fit himself to the crowd, to all the complexities of a life which is always growing more complex and intimidating.

This adaption can not, at this stage of the evolution of our industrial system and of a working life such as practically all men and many women must take up, be secured by instinct; it must come of a deliberate provision of education and training, beginning with the infant and continuing through the period of youth and, with certain classes, beyond adolescence into the stage of maturity. With advancing complexity of civilization, instinct, hereditary memory, continually loses its efficiency as a guide and protector of the individual life; education and training, the wisdom of age reduced to formal expression and of experience stored in available form, become more and more vitally essential. This means that the ability of the parent and of the state to provide such knowledge, in schools, colleges and professional seminaries, is constantly becoming more important in the struggle of the individual for life and for the good things of the world; that the position of the individual in the social scale and among his fellows is steadily exerting a more important and controlling influence; and that heredity must tell increasingly through material success and accumulation of material potential powers. Where, once, a man could make a success in a generation, starting from the lowest level, and where, of late, two and three generations are more often needed, soon highest success in great achievements can be expected ordinarily to follow only on foundation building which has occupied ancestors of several generations, steadily and persistently adhering to the fundamental elements of progress throughout. This, again, means the gradual progression of social stratification in a more and more distinct manner—a result which, however unsatisfying to our democratic inclinations, must probably be accepted as inevitable. We shall probably enjoy, however, the compensating fact that the lower strata will continually find higher levels assigned them, so far as their position is determined by ability or good fortune. All honest endeavor will be better rewarded, and the extent of reward will include a wider range, with extension of that range mainly in the upward direction.

Such conclusions can hardly fail to follow any serious study of the progress of modern life, specially of modern industries and their resultant developments, in any civilized country. The correctness of these conclusions is shown clearly by the statistical, as well as by the more general, method of historical investigation. It is this which has brought about the discovery that, on the whole, such progress tends to reduce, relatively, the numbers of the very rich and of the very poor, increasing by similar proportion the relative numbers of the intermediate, well-to-do class, while all the time raising the standard of living of the latter. It is only necessary for any person of middle age to look back to the days of his childhood to perceive this last fact distinctly; and a perusal of the pages of Buckle or Lecky, or the reading of the general literature of the last century, will show how rapid this change, moral and intellectual as well as material, has been since the crystallization into form of the contemporary industrial method and since the entrance of any people into the characteristic form of modern life. Read, for example, if more detail is desired, Wells's *Recent economic changes* as a supplement to portions of Draper's *Intellectual development of Europe.*

The indications of a coming change may be seen as far back as the beginning of the 17th century, when that wonderful renaissance of scientific research began which has continued, uninterruptedly, to our time; but the progress then initiated became sensible and its movement became a distinct acceleration, of rapidly increasing rate, only in the 18th century, after inventors, who in ancient times would have been made demigods, gave their fellows the machinery of the textile industries, of the iron and steel manufacturers, and, above all, that Archimedean lever which now moves the world—the steam engine. With the birth of the 19th century progress assumed aspects previously unknown, and change became so rapid as to cause disasters to many, while promoting the best and highest interests of the world as a whole. The "trend of progress" not only became marked, but its curve took on increments of gain which were themselves subject to acceleration. The "curves of prog-

ress" rapidly, and more and more sharply, rise with the growth of the century and, as yet, with no indication of change of law. The 20th century seems likely to illustrate quite as markedly as the 19th this wonderful progress of the great body of the people toward a higher and better life in all its phases.

But there are many other gages than those of the older historian, measuring this progress, and, in our time, the measure generally regarded as the most satisfactory is that of the consumption of iron and steel; since these forms of the most precious of metals are employed, directly and indirectly, in every department of modern life. Its most important industries and most widely spread blessings are absolutely dependent on the use of these metals for their value and fruitfulness. All great industrial operations, whether in textile manufacture, in food production, or in transportation, are dependent on the supply of iron and steel, and the amount produced, *per capita*, thus measures the wealth, the comfort and the general prosperity of a country. During the century, for example, our own country has increased its annual production from an insignificant amount to nearly 15,000,000 tons and from a correspondingly insignificant weight, *per capita*, to nearly 400 pounds for every man, woman and child in the nation, about 1 ton to the family. The rate of consumption is still growing, that of production is increasing in still higher ratio, and we are beginning to supply the markets of the world with manufactured iron and steel.

But there is still another measure of progress which is, in a sense, better than even iron and steel production and consumption. Though not more accurate, probably—I doubt if anything could be more accurate—it is more satisfactory in that it shows us a more interesting aspect of progress, a more important phase of evolution, than the material gage. This is the progress of higher education, as supplementary to the common school education of earlier decades, the latter of which lies at the bottom of all intellectual advance in our country. The common school system and the political and individual freedom of the American citizen, together, have promoted most effectively the march of

invention and the perfection of industrial systems, as well as all other good works in every department of human life. The particularly impressive phase of educational advancement in our own time has been the extraordinary stimulus given higher education, specially in those departments of applied science which have furnished the scientific basis of modern industrial life.

Studying the "trend of national progress",[1] as I have called it, we find that the iron and steel production may be shown by a set of curves of progress, which have their very exact counterparts in the curves which relate the growth of the working power of the world since Watt to the flow of time during the century; and these, in turn, will be found to have a very close relationship to those which exhibit the development of the modern forms of the technical school and the scientific departments of our academies, colleges and universities. All show a low figure for output in the early part of the century, a hardly perceptible growth in the earlier decades, a sensible acceleration toward the middle of the century, rapidly increasing advance, with an increasing *rate* of acceleration, as we enter on the last quarter century, and all exhibit wonderful progress in these later years.[2] Laying down these three curves on "squared paper", a singular correspondence will appear, and there becomes obvious the fact of some common cause. Comparing the series with another graphic presentation, that of the growth of that product of industrial activity which represents permanent wealth, that class of products of manufactures and industry which Mr Mulhall calls "sundries", we find an almost exactly similar trend of the curve of progress as indicated by either line, and, when we farther investigate the subject, we find another set of similar curves representing the gain of the nation in wealth, both aggregate and *per capita*, specially in that portion of accumulating wealth which is secured by the people as wages, both aggregate and

[1] Thurston, R. H. "Trend of national progress," North American review, Sep. 1895.

[2] ——— "American competition." London engineering, Mar. 30, 1900.

per capita.[1] All these simple, yet most expressive and instructive pictures of the progress of the nation are, each in its way, expressions of the progress of the civilized world; for all civilized nations furnish us such illustrations.

During the 19th century, the inventor has increased the power utilized from the forces of nature, from perhaps 5,000,000 horse power, at the time of Watt, to, in this country alone, 25,000,000 at the middle of the century, to 70,000,000 in 1875 and to about 150,000,000 at the end of the century. Wealth increased slowly in the early half of the century, doubled several times between 1850 and 1875, and then commenced, with the latter date, that wonderful progress which we have since observed, amounting, now, with the close of the century, to about $25,000,000,000 in houses, $15,000,000,000 in lands, an equal amount in railroads, and some $5,000,000,000 in factories and an equal sum in cattle; while the "sundries" account, measuring all the characteristic comforts of civilization, has risen from $2,000,000,000 or $3,000,000,000 in 1850 to twice that sum in 1875 and to $30,000,000,000 in 1900. Wages have risen from about $300,000,000 aggregate in 1850, to $750,000,000 in 1875, to above $5,000,000,000 in 1900; the operatives receiving, each, on the average, not above $250 in 1850 and $350 in 1875 but reaching $500 in 1890 and nearly $700 today—the highest compensation in any country in the world and in all history. Of this, also, every dollar, and every day's labor, buys more today than ever before in the history of civilization. The 20th century opens with this marvelous and optimistic outlook and, if no wars, pestilences or other social catastrophes, break the curve, its history is likely to be as marvelous from the point of view of the generation living at the dawn of the next century; indeed vastly more marvelous than the retrospect which we enjoy at the close of the 19th century.

Could similar statistics be secured, and pictured in curves of progress illustrating the advance effected in educating the people, very similar and no less surprising and encouraging conclusions would be reached, both regarding the past and respect-

[1] Thurston, R. H. "Trend of national progress." North American review, Sep. 1895.

ing the future. Today, 16 of the leading colleges of the United States report about 40,000 students registered, and their annual output is about 8000 men; of whom probably 1000 are in the departments of engineering alone, and a still larger proportion in the more ancient departments of the so-called learned professions. To the latter, however, the former are now to be added, since their requirements for admission are more exacting and their courses of instruction are more crowded, are generally more mathematical and are fuller of branches demanding brain and work. The century has seen enormous growth of collegiate work, specially in the departments of applied science.

The compulsion which has brought about this immense development of higher education has consisted, we must conclude, of three main elements: 1) that ability attained through increased and more widely and uniformly distributed wealth, on the part of the people, to secure higher education, which always marks such progress as we have traced in our material evolution; 2) that constantly growing demand for more generally learned men in the professions, including now the constructive professions; 3) that constantly growing and increasingly intense demand, in all industrial vocations, for a scientific basis for all industries and for highly trained, for learned men in all great enterprises and in every system of industrial production. But all these elements of the aggregate compulsion rise out of and accompany the evolution of the modern industrial system; which, in turn, is based on that progress in civilization through the work of the inventor, the mechanic and the man of science which is giving us such marvelous accumulations of material wealth, with all its higher accompaniments in the realms of the sciences, the literatures and the arts, fine, useful and esthetic. This development gives at once the stimulus and the opportunity.

Perhaps the best index of the magnitude and importance of the demand which the country is making on the teachers of science for a basis for industrial development is seen in the growth, during the last half century particularly, of the profession of engineering and in its characteristic changes, in conson-

ance with the alteration which has taken place in the industrial situation in the last generation. At the middle of the century, less than 50 engineers were graduated from the schools of this country each year, and those were mainly, nominally at least, civil engineers, and their principal employment was railroad building. After the close of our civil war, the mining and the mechanical engineer began to find a larger place in the industrial system, and during the next 20 years their numbers became, each, about one third as great as the number of men engaging in civil engineering[1]. Since that time the number of civil engineers has relatively decreased, and the output of mining engineers has been almost stationary; while the number of young men going into the mechanical branch has increased enormously and now considerably exceeds the number in the oldest division. The total output for the country is now about 1000 a year, and the growth and the rate of growth are both continuously increasing. Reckoning from 1870, the total gain in numbers is equal very nearly to the square of the number of years elapsing; which indicates a rate of progress parallel with that shown in the curves of the industries generally and of the wealth of the nation and of the average citizen.

The deduction of most importance in this connection is that the teachers of the country, specially the teachers of science and of technical subjects in applied science, may expect some such law to hold in the immediate future and probably for many years, if not for generations; and they thus find here a measure of the responsibilities devolving on them and of the splendid opportunities coming to them in the evolution of the "complete and perfect education" and of the Utopia that will certainly be realized by our successors, in later generations, if only humanity is permitted to lead the march of the world, unchallenged, as absolutely as have representatives of baser character in times past.

The scientific basis of modern industry must hereafter be supplied by the engineering and trade schools, and the sciences will

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[1]Thurston, R. H. "Technical education in the United States." Trans. Am. soc. mech. eng. 1893.

ecome more and more completely the foundation of all indusries. The generals of the industrial army must be more comletely and perfectly educated for their work, and more and more ultured, as they become more essentially leaders of men and ources of power. The preparation of youth for entrance into hese constructive vocations and professions must be bégun in he preparatory schools, and, consequently and obviously, the rosperity of the nation and its place among nations will ultinately be determined largely by the wisdom, the earnestness, he talent and the conscientiousness of the science teachers in ur schools. Men of large views, wise understanding, unselfish nd unprejudiced minds are now needed, more than ever before, o guide legislators, administrators, people and pupils; and nowhere are they more to be looked for than among our contemporry science teachers—free from tradition, prejudice and selfnterest as is no other class in the community.

It is thus that we find all our curves of progress obeying simiar laws and following parallel lines throughout the century, romising hereafter similar parallelisms, through the immediate uture, at least, and probably through the coming century. The 0th century will, we may hope and expect, illustrate precisely s the 19th has this mutual interdependence of all stimuli and ll opportunities. Productivity, wealth, all material and intelectual and spiritual progress will be more and more closely inerrelated as time progresses. The revolution, though effecting hese wonderful changes in the "wonderful century" as Wallace alls it, just past, has but, in fact, only now begun, and the hange thus inaugurated remains to be completed in a future he duration of which we can not yet surmise, much less predict.

Every modern industry has a foundation in applied science. Art has ceased to be empirical, and all arts have become sysematic and scientific. Chemistry gives us today a revivified oil, selects for us the most remunerative crop for the location, oil and climate, determines for us the best food for the plant nd the most appropriate method of cultivation; entomology eaches us the habits of the useful and the harmful insects, shows

us how to save a million dollars in a year, among the fruit trees of western New York, and how to battle with the hosts of the army worm and the locust; botany gives us new edibles and teaches us to cultivate them; mechanical science supplies the agriculturist with his mower and reaper, his binder and threshing machine, his gang drill and steam plow, transports his harvest to a transoceanic market and gives the laborer in New England flour from a mill in the northwest, at lower cost than is made at his own door, minimizing and evening the costs of existence to all the world. The chemist gives us an artificial madder and changes the course of trade in a great staple, benefiting thousands; the physicist provides us with a science of electricity and gives to the engineer control of a form of energy which distributes power from waterfall or steam engine over miles of railway, or to a thousand arc lights, or to an industrial center beyond mountains and valleys, or to widely separated nuclei of manufactures and trade.

The mathematician gives to the astronomer his tools of trade, and the astronomer shows the mariner how to find his way from port to port over thousands of miles of intermediate ocean and to enter the distant harbor without changing his course by a spoke of the steering wheel, as safely at night as in daylight, or in storm as in calm. The ship-builder avails himself of hydraulic science and builds a ship of iron, lighter and vastly stronger than any wooden vessel, reducing wasteful weights, increasing paying cargo and capable of crossing the Atlantic in less than six days. It is driven by engines of 30,000 horse power and boilers sustaining pressures of 10 or 15 atmospheres. The marine engineer is transporting a ton of freight a mile at sea, with the amount of fuel contained in a single half ounce letter. The builder of the best mill or water works engine of today, availing himself of every discovery in the domain of thermodynamics and of all the perfected and scientifically constructed tools of the educated machine-designer, produces a hundred or a thousand horse power with the expenditure of a pound of fuel, or of something above 10 pounds of steam, for each horse power

hour; while the builder of the gas engine of equal power claims to have already surpassed this splendid record. The engines of Watt demanded several times as large a fuel supply; and even so late as 1850, when the science of thermodynamics and the methods of experimental science in this field were in their infancy, but about one half as large a return from a stated amount of stored energy in fuel could be obtained by the most successful constructors. It is achievements of science such as these that have given to the world its present wealth, comfort and intellectual powers and privileges; even the spread of acquired knowledge by printed books and every function of communication of ideas now depend for effectiveness on the genius of applied science, as illustrated in the perfecting press and the machinery of the book-making mechanician.

The development of science through research, its extension by cooperation of all investigators with all teachers and its utilization by the technical and industrial vocations and professions are thus among the essentials of modern progress. All workers, in all these departments, must work hand in hand and each with zeal and efficiency, if we are to make the most and best of our opportunities; and the scientific basis of modern industry can only thus be laid down. It may compel a complete revision and reconstruction of our curriculum; but we may be assured that whatever is needed will be found practicable and will ultimately be secured, and any cost in time or labor, or sacrifice in minor matters, will be fully compensated.

The most learned men of our time are, as a rule, not members of the "learned professions", distinctively so called in earlier days, but are found among the teachers of those aristocratic classes and among teachers in all departments of learning, among men of science, philosophers, diplomats and engineers, mathematicians and philologists, jurists and men of achievement, as well as among men of books. The expansion of our colleges is, in these times, mainly on the side of natural science, applied science. All languages and literatures, all mathematics and all ancient forms of learning are now valued both for their disciplinary effect,

as of old, and for their helpfulness in the making of a man competent to aid his fellows in the highest degree. As I have often quoted, "it is as easy to go somewhither as to walk around the square" in the acquirement of learning and applied science. Applied gymnastics and ultimate accomplishment of good become the gages of the value of the man, and of his life, in the minds of all who have come completely out of the past into the atmosphere of the contemporary world. Dreams and dreamers are today alike ignored.

Thus it happens that our colleges are so rapidly becoming catholic and universal in their range; and the real test of the desirability of a study therein is now helpfulness to classes of men hitherto unable to secure opportunity for higher learning in their sections of the intellectual world or in their broadening and rising professional requirements. Does any sufficient body of men desire and need this opportunity to acquire learning in this field? This is the real question to be asked and answered by the college, the professional school of the university. We are today becoming as catholic as the Egyptians at Thebes and the Greeks at Alexandria and our curriculums as correctly university programs as were those of their colleges; yet it is mortifying and saddening to recognize the truth that 2000 years have elapsed since a true university was planned and organized, and that only now have successors appeared to those pioneers. Even now such are few in number, incomplete for the times and still subject to obstruction in a multitude of ways. The contemporary Cornellian idea was that of the unknown early Egyptian, of Aristotle, of Descartes, of Milton, of the marquis of Worcester, of many wise men living in the intermediate periods. Of all the nations of our day, only the Germans have systematically followed the Aristotelian idea in its generality and have formally established a national, universal, system of "instruction of any man in any study", as Cornell phrased it; only the French have organized a national university, after the ancient plan, at the capital of the country; and only the United States has a system

of primary education aiming at the instruction of all classes and conditions of youth in all the primary studies, universal in its welcome of all the children of all citizens.

France, Germany and the United States thus have, each, an element of a correct system of education of a people for the life and work of a people; but neither has a full, spherical, organization of an educational system which provides for the children of all sorts and conditions of men, offers a training in the scientific bases of all modern industries, gives to all youth their choice of path into the kind of life and work best adapted to the natural talent of each, and affords free access into the learned professions for those capable of entering with promise of success. Our common school system requires supplementing by an equally catholic organization of scientific, manual training, trade and technical schools, such as Germany has provided, and by development, in college and in university, of the whole scientific basis of all the great industries now demanding firm and deep foundations, such as never were required before. Still more, above and beyond the whole university of instruction, is needed provision for extensive research in all departments of sciences, literatures and arts, in which men of genius and talent shall be given leisure and opportunity deliberately and fruitfully to display their powers in the extension of human knowledge and in opening new paths for the teacher, the inventor, the organizer of industries; accumulating learning for transmission downward to all men capable of profitable acquirement and use of the fruits of original research and discovery. The whole completed and symmetrized system is to be mainly developed by extension of the sciences and their applications; for the older learning is already admirably presented in the pioneer institutions of learning of all grades.

A noble beginning has been made; but all our newer departments of education are still more or less dependent and mendicant, and must so remain till the state can be induced to provide fully for them—as fully as for primary and secondary education.

The western states are doing something in this direction, and in some cases in a creditable though still incomplete way. The Miltonian "complete and perfect" education can not be entirely organized, however, till statesmen shall arise capable of appreciating and of inaugurating and liberally sustaining that university which shall comprehend all divisions of the curriculum furnishing Huxley's ladder, leading from the gutter to the research department of the university, for the son and the daughter of every citizen, whether of high or of low degree, if only intellectually capable of climbing it.

While it is obviously a folly to attempt to utilize "a three story education in a one story brain," it will be admitted to be the highest aim of statecraft and social economics to see that every "three story brain" shall have the opportunity to acquire a "three story education" and thus to return to the nation a many-fold premium on the investment. One great mind lost to the world through lack of the highest education which it is capable of utilizing is a more grievous loss than sunken fleets. One Watt, Faraday. Corliss, or Darwin, undeveloped and uneducated to the highest point of vantage, means loss inestimable. One great man at the highest altitude to which he is capable of rising is worth more than any mine; one gènius, trained and cultured, outvalues a multitude; one statesman, one industrial commander, one great exploiter of scientific knowledge, counts for an army, for he makes effective an army, saves a country from ruin, raises a nation to previously unimagined hights, confers the comforts of the highest civilization on the people or gives his fellow-men leadership toward hitherto unexplored realms of wisdom, knowledge and opportunity. The grandest financial expenditures by the state are those which develop moral, intellectual and physical forces for the benefit of the nation.

The progress of the century past has been largely due to the fact that every modern industry has come to be underlain, as we have seen, by a scientific foundation; the laws of nature are made the basis of every act of every worker, every operation is carried

through a sequence of movements of man or machinery or both, dictated by natural law and human reason, and the construction of mechanism derived wholly through scientific method. Agriculture has a science which is a composite of chemistry, botany and entomology; mining and metallurgy find a foundation in the sciences of chemistry, geology, mineralogy and thermal physics; architecture builds on geology and applied mechanics and the fine arts; the textile manufacture depends on the sciences underlying the production of cotton, the breeding of sheep and the cultivation of the silkworm; the construction of machinery is a problem in the mathematics of applied mechanics; and the heat engines derive their powers from the forces of nature through application of thermodynamics, physics and chemistry. All civilization depends on the thermodynamic machine for physical power; all races derive their life and energies from agriculture; and spiritual life profits by the wealth of learning, mainly in the domain of science, which the successors of Aristotle have distributed to the world while depending on accumulated wealth for their sustenance meantime. The science of life, the science of wealth, the science of industry are each essential to the perfection of human life. All are parts of one pantology, the perfecting and completing of which is the task of the century. Learning without law is an impossibility, and the sciences of learning are the sole basis both of all industries and all worthy life.

There is no nobler task in this completing and perfecting of the modern education than that of the science teacher, and his labors are becoming daily more fruitful and encouraging and better recognized. When the agricultural departments of the land grant college of the state of New York send out nature study leaflets to 20,000 members of the Farmers reading class, print 250,000 pages, in a single year, of "teachers leaflets," supplies 35,000 copies of each study for the "junior naturalists clubs," teaches 2500 members of home study classes, provides science lectures for 30,000 people, printing an aggregate of 7,000,000 pages in a year, distributing them among those interested in

agriculture and kindred studies alone, it can hardly be asserted that the work of the science teacher is not appreciated or that it is not, in extraordinary degree, useful. Yet the work in this one department of industrial activity is but a fraction of that which must ultimately be called for in the maintenance of the scientific basis of the modern industries in all the vocations and professions.

A "complete and perfect" system of education of the people thus provides largest, richest, best returns. What we term technical or professional education is that highest form of preparation for life work in highest fields which constitutes the noblest kind of apprenticeship; and the science teacher's task is an essential element of this preparation of the citizen for the grandest tasks of our time. This means the approximation of our methods and of our intellectual product to the ideals of Aristotle, of Hero of Alexandria, of Leonardo, of Descartes, of Comenius, of Paley, of Bacon, of Milton, of Worcester, of the great French scholars and the great German statesmen of our era, and to the highest and noblest ideals of all our own greatest men, from Washington, Jefferson and Lincoln to Wayland, Walker, Cornell and Andrew D. White. It means the universal completing and perfecting of the citizen's education with due regard to his capacity; so that, as Milton expressed it, he may "perform justly, skilfully and magnanimously, all the offices, both public and private, of peace and war". Today the opportunities, the duties and the victories of peace, rather than war, direct our judgment and our work and involve the useful employment of all arts and sciences, the utilization of all literatures, of every mental and physical talent and of all the available energy of the man. In all this, science must hereafter perform a vastly higher and more fruitful part than ever before; and her duties will become more and more fruitful, ennobling and helpful, to teacher and pupil alike, as the years go by, and as the new century reveals its many and mighty tasks to us all.

Saturday morning, 29 December

SECTION MEETINGS

Section A. PHYSICS AND CHEMISTRY

RELATION OF HIGH SCHOOL TO COLLEGE PHYSICS

BY PROF. JOHN S. SHEARER, CORNELL UNIVERSITY

The rapid introduction of physics into high school courses and the demand that the work done there be accepted for entrance to college make the relation between high school and college work of ever increasing importance. In the discussion of the matter we may leave out of account the fact that most high school students do not go to college, as we are here concerned only with those who are preparing for higher work.

Several years ago, while teaching elementary college studies, I was surprised to find that many of the students having the greatest difficulty with the work had evidently had a course in the subject before. Last year, when again giving the same work, I looked into the matter with some care and secured statistics as far as possible concerning previous work in physics. The result was that the average grade of those having had a previous course in preparatory schools was a little over 3% higher than that of students taking the subject for the first time. If those coming from four schools were excluded from the list (nine students), the average of those having had previous work fell considerably below that of the others. While of 35 men who failed in the subject, 19 reported previous work, five had not studied before and 11 gave no answer. I learned later that several of the 11 did not like to admit that they had taken a preparatory course. It would seem from this that in our case at least, the high school course is not as good a preparation for future work as might be desired. It remains to seek the causes which may have led to this result. We can hardly postulate that the men who had had high school work in physics were mentally inferior to the remainder of the class, and the fact that several men who prepared at certain schools stood extremely high indicates that a preparatory course may be of great benefit.

The best indication of the probable causes of failure may be found by careful observation of the students themselves. My own experience leads me to believe that the following are among the principal sources of trouble.

1 Formulas are memorized without any clear understanding of their meaning.

2 Problems are solved by rule of three as a substitute for careful analysis.

3 The student is carefully shielded from any encounter with the real difficulties of the subject.

4 He is allowed to acquire the idea that the entire subject is included in the elementary text he uses, or at any rate in the brain of his teacher.

5 The idea that physics pertains only to the classroom and laboratory and has no connection with actual affairs is too prevalent.

6 The habit of self-reliance in testing things by experiment and by deduction from known laws is not developed.

With regard to the first of these it may be said that there is no method more fatal than crowding the brain with meaningless formulas. We often find men who failed repeatedly in physics who remember more formulas than an experienced teacher ever expects to know. It seems almost impossible to make students believe that their entire time should not be spent in memorizing aggregations of symbols absolutely isolated from any realities. This tendency is doubtless encouraged by a certain type of examinations which can be passed as well by this method in many cases as by a more scientific one. We have found that questions shaped so as to make direct application of formulas inconvenient, together with examinations in which students are allowed to use their textbooks, greatly reduce this tendency.

If the method by which problems are attacked is carefully observed, it will often be found that the educational value of problem work is almost entirely lost. The tendency of nine out of 10 beginners is to solve a problem by pure imitation of a textbook solution having similar wording. Failing in this, that ever

present crutch for weak minds, "rule of three", is impressed into service. Having carefully observed students in all stages of advancement in the subject, I have yet to find a single one habitually solving problems by this method who has been fairly proficient in the subject. The careful analysis of a single problem is worth more than any number of mechanical solutions.

That there are real difficulties in physics no one familiar with the subject will deny. Indeed, it would be hardly worth our while to study or teach it if there were none. Why then should the beginner be lulled into fancied security by artificial simplicity only to be rudely awakened when the work is taken up again? I do not mean that he should be forced into work too difficult for him, or that topics unsuited to his advancement should be presented for discussion, but that the work should be rigid enough to demand at least as much mental effort as corresponding courses in mathematics or classics.

Not infrequently we find those whose thorough study of a very elementary course is an actual handicap for any university work. Two of the most hopeless cases I ever saw were men who had taken a postgraduate course in physics where the work was of a grade inferior to that which many of our best high schools offer. They were firmly imbued with the idea that what they had done covered all of physics worth doing. Their minds were completely fossilized by long plodding in an infinitesimally small field. The student or teacher either young or old who feels that his subject contains nothing new for him has passed the period of usefulness. There is no subject more intimately related to everyday life than physics. The entire universe around us is a great physical laboratory. Every movement is an example of mechanics; the phenomena of sight and hearing, the way our buildings are heated and thousands of other things contain problems yet to be solved. The boundary between the known and the unknown has been slightly modified during the century just closing, yet how little of natural phenomena is in any sense understood at the present time!

The student should also be early taught to depend on his own resources and to trust his own observations. Hours are often spent in trying to find something in a book when an actual test could settle the matter in a few minutes. There is nothing more trying in a laboratory than a student who is never sure whether he has measured correctly or not, or one having no initiative and standing dismayed whenever an unexpected difficulty arises.

My idea of what the high school should strive to do for the student in physics is perhaps apparent from the foregoing. Stated in few words, the aim should be to develop correct methods of thought and study rather than to attempt to overload the mind with disconnected facts. Living cyclopedias are seldom useful either in college or elsewhere. One who does not know some things may be easy to teach, but a man who does not know how to think is a burden to all whom he may encounter. The men we need most are those who can think and do instead of those who remember and repeat words.

No time should be spent in college in unlearning things which are not so. We have far more trouble in attempting to teach Ohm's law to students who have learned that $C=\frac{E}{R}$ than in any other one thing in electricity and magnetism. Rather, the college course should be an unfolding and development of the mind along lines of thought already properly established. The high school should leave the student with a living interest in the physical phenomena which surround him. His thinking powers should be quickened by actual contact with real things and not paralyzed by textbook phrases and obscure formulas. He should not acquire the idea that all of the active world has been formulated in books or that apparently simple laws are unworthy of careful study many times repeated. To one properly trained no physical phenomenon is so simple as to become uninteresting. Above all, there should be a development of ordinary common sense regarding the commonly observed phenomena in everyday life. The aim should be a golden mean between a course so difficult as to lead to discouragement and one so easy as to delude him into the worse condition of mental frivolity.

In work of this kind we must remember that the personality of the teacher is of more importance than any other single factor. A well equipped laboratory and convenient lecture room are to be desired, but teachers having a knowledge both broad and deep and withal a living interest in the development of their subject are indispensable. We hear a great deal about methods, the relative value of classroom and laboratory work—questions of great importance of course; but I still insist that a knowledge on the part of the teacher much deeper and broader than the student can attain at his stage of advancement is the essential thing. Better teachers are required for those totally unfamiliar with any subject than those who are well started in the right way. And this is preeminently true of physics. I have no hesitation in saying that the realization of the highest ideals in the teaching of high school physics demands better preparation and greater resources on the part of the teacher than are required in elementary college work.

Do not think that I in any way reflect on the efforts of the teachers in preparatory schools. No one appreciates more fully their difficulties; and I only wish that their efforts may be directed from the right standpoint and toward the right end. Neither do I forget that the high school pupil is less mature than those who begin work in college; but I firmly believe that mental habits are often firmly acquired early in school life. The proper development of the thinking mechanism of an individual is a greater task than forcing the memory to retain physical constants or abstract formulas.

When work of this kind is done in all our high schools, the cry that the mental training of science is inferior to that of mathematics and classics will become an echo of the past. Then there will be no trouble in securing recognition of work for entrance to our colleges and universities.

That such task is a severe one I certainly would not deny. Yet I feel that it can be done, if to the skill of the teacher you bring the living enthusiasm of the investigator; and such an accomplishment affords one of the highest ideals for the teacher of science.

Prof. O. H. Robinson—The work done in physics in the preparatory courses is not as a rule such as can be used to advantage by college professors. We can not begin where the high school and academy teachers leave off. We can not build advantageously on the foundation which they lay. The trouble results from no fault of theirs, but from the nature of the course which they have to give. In almost all cases their classes are made up of a few students who intend to take a college course and many students who have no such intention. They are obliged to teach these two classes of students together. What is wanted is a general, and somewhat popular, course covering all the subjects usually classified under the head of physics. This is given; for it is the only opportunity the majority of the students will ever have to study these subjects. Now, no one doubts that this work is well done. The teachers are scholarly and conscientious. They do excellent work. Wherever time enough is given to them the students acquire a good general knowledge of the subjects.

But when all this is said the fact remains that the college preparatory element in such classes does not get a good preparation for college work. This results, in my judgment, mainly from two causes.

First, having gone over the whole course before entering college the novelty of the subject is gone. A student of mature years, or a professional student, has the patience to dig deeper into subjects of which he has a general knowledge; but youths in a non-professional course are not so. They need the stimulus of novelty. Moreover, if they have done their preparatory work well they are quite sure to think that they already know what there is in a course in physics. This is very natural. Their teachers have, very properly, recognized their merit in the study of every subject; and what more can be done?

In this attitude of mind a student enters on his college course with the intention of doing very little work in physics. Has he not done that work already? Half an hour a day should suffice to look over the lessons, and refresh his memory. He divides

his study hours among the subjects in hand on that basis. Perhaps he takes on himself an extra course of something, assuming that he has time to spare. In a fortnight he finds that the study of physics is not what he thought it was. His professor is not satisfied with mere descriptions of phenomena and statements of laws. He is expected as far as possible to prove the laws as he goes, and reduce them to proper algebraic formulas. He must solve a lot of problems, problems which require the use of his formulas, and of trigonometry and analytic geometry. His half hour will not suffice. In a month's time he is behind his class, and discouraged. I am giving no fancy sketch, or mere theory of the case. I am presenting a practical difficulty which I have met again and again during a long experience. Students in mechanics come to me in great trouble in the middle of their first term—fairly good students too. After all their study of physics they don't see why they have such hard work to get their lessons. The author does not state things clearly. The teacher is too exacting. I see the difficulty at once. On inquiry they own up; they have not thought it necessary to put time enough on the work. They have got behind; and every teacher knows what that means in a subject like mechanics. It means for them a radical change of habits, or failure. What is the result? With no novelty to interest them, and not intending to pursue the study professionally, they determine to get through the term as best they can. At all events they act as if they had so determined. Now my conviction is that the majority of students so prepared would have been better off at the end of the term if they had entered on the college work without preparation. I have every year in the same class with them those who have so entered, and the comparison is easily made. What I have said of the first term may be said with slight modifications of subsequent terms.

A second reason why, speaking generally, the high school student does not get, and can not get, a good preparation for college work in physics arises from his lack of mathematical equipment. To a certain extent this underlies also what has already

been said. It is practically the primary reason why preparatory students can not form habits of study in physics which they can carry with them into college work. They are so handicapped that even the best teachers must fail to develop in them such habits. Preparatory courses do not as a rule contain the mathematics necessary to study from the very beginning the subjects contained under the term physics as a student preparing for the liberal study of a college course should study them. A student who begins them with his algebra, geometry, trigonometry, and analytic geometry all well in hand can form the right habits at the outset. He has no disappointments, no bad habit to overcome as he progresses. His interest is sustained throughout by the novelty of the subjects as he takes them up. He does not get discouraged but pursues his course steadily and successfully to the end.

What is the remedy for this state of things? The answer requires more time than can be given to it today. Clearly the high school and academy teachers are not at fault; and just as clearly their students are not at fault. Some one else may find a solution of the difficulty; but with my present knowledge of the subject, acquired by long experience, it seems to me unwise for students who intend to take a college course in physics to enter on that branch of study before they have the mathematical preparation for it.

MANUAL TRAINING OF CHEMISTRY

BY PROF. WILLIAM E. BENNETT, ROCHESTER HIGH SCHOOL

From the turmoil of discussion and the research which in these days distinguish the educational world, a new conception of the aim of education is evolving. This comes slowly, with much labor and many mistakes, but the result is to be a system which shall develop full-rounded character—manhood and womanhood capable of thinking but also capable of doing.

The school of past years, whether primary grade or university, aimed to develop mainly the intellectual side of the pupil; but within recent years the business of the world has demanded,

and today it demands trained specialists; and, as a result of this demand, much attention is paid to the education of the body—the training of the senses and muscles.

To be sure, much specialization is intellectual, but the utilitarian world pays its most immediate and richest material rewards to the doer rather than the thinker, and, as a result, by far the most specialization is a training of the physical powers largely.

From each of these extremes we should take the best. The educator is beginning to realize that neither mind nor body alone is to be developed, the one at the expense of the other, but that the fullest harmonious development of both must be sought, and that the activities of the two must be coordinated to the largest possible extent by that educational plan which is justly to claim preeminence in the development of well rounded life.

It is not the purpose of this short paper to state the scope or value of manual training farther than to call attention to one or two of its most salient points as they are connected with our topic, the manual training of chemistry. Nor is it thought that chemistry alone of the sciences offers opportunities in this field. But, while any laboratory science offers fine advantages for this sort of training, laboratory chemistry offers some points of special adaptability.

Already the value of manual training is recognized in some of our best secondary schools, and a place is being made for it in the public school curriculum. In fact, the wide extension of laboratory methods of science teaching in the last decade or two is but the logical outcome of this trend of pedagogic thought. Yet it is to be feared that oftentimes the laboratory is considered and the laboratory work is planned to stimulate mental activity and give clear perceptions alone; while the adaptability of this work to the coordination of mental and physical is either not understood or is simply ignored.

This work can not by any means be left to the trade schools. The trade school does not give good manual training, using the

term in its larger sense. Its purpose is entirely too utilitarian. Its aim is largely to make certain courses of action automatic, to train the fingers to obey reflex nerve action rather than the conscious will. Now, to enlarge the domain of reflex action and thus free the mind from attending to a mass of details is, of course, legitimate and valuable education; but that manual training is the best which adds to this advantage that of stimulated mental activity, and which supplies food for mental growth.

Let us take a simple example to illustrate this. It is far better, considering it on the side of character development, that a boy who is to learn wood-turning for instance, should be taught it as a part of a well planned course of education than that he should learn it in the best equipped practical wood-working shop in the world. Granted, for the sake of the argument, that he may learn to turn out more work and with a better finish perhaps in the shop than in the school—and even this claim will bear argument—still the purpose is not to develop a wood-turner but a character. The shop teaches him perhaps to hold his chisel in a certain way simply because it cuts better. The school must teach him the same fact and, in addition, that the grain and texture of the wood and the play of natural forces there acting are the reasons for this. There is a chance right here to work in that favorite old term "apperception," but I will forbear. In short, the shop busies his hands, the school his brain with his hands.

Another consideration, of which time will allow only the statement, is that manual training gives increased power of expression, and all education means power of expression.

Believing it to be generally conceded, then, that manual training is not only a legitimate but a highly desirable part of a public school system, I wish to place special emphasis on the peculiar adaptability of laboratory science work in general and of chemistry in particular for just this sort of development.

1 Chemistry is the first subject in which a school attempts to offer laboratory work. Perhaps 50% more of secondary schools give laboratory work in chemistry than give it in physics.

The reasons for this are that a moderate outfit is not expensive, and the cost of maintaining the work when once started is small; and again the usually overcrowded science teacher can handle large laboratory classes better in this than in other subjects.

2 The thought processes connected with an experiment in chemistry are not so involved as those of physics, and the pupil's mind is not too completely absorbed in his course of reasoning to give heed to his method of doing.

3 System and order can be more effectually maintained in the laboratory. This is possible because each pupil may and should have his own complete and uniform set of apparatus, and all perform an experiment at the same time, while duplicate sets in other science work are generally quite expensive, and therefore seemingly out of the reach of any but the most liberally supplied schools. Furthermore, the teacher may comprehend almost at a glance the kind of work being done by pupils and may correct mistakes at the outset.

4 Every experiment for its most complete success demands deftness in manipulation, adroitness in the arrangement of apparatus, as well as care and skill, and ingenuity in overcoming mechanical difficulties.

But even with these points of peculiar adaptability, laboratory chemistry will not attain the results of manual training unless the work is well directed, has continuous oversight on the part of the instructor, and is planned with those results in view. Any methodless method of turning a class loose in a laboratory to prepare some element, as hydrogen for example, and study its properties, according to the ill directed ingenuity of the pupil or the scanty and sometimes unintelligible directions of a text-book, may develop the pupil's appreciation of new ways of having a good time, as he touches a match to a bottle of hydrogen with the hilarious exclamation to his follows, "now, here she goes." But such a course will utterly fail of the most valuable results of the subject.

Personally, I have no sort of patience with the fad that says, "You must never restrict the developing tendencies and never

hedge in the activity of the child, but just let him develop according to his natural disposition." Those who advocate such a course certainly have no belief in the doctrine of original sin. Our cities have large police forces, asylums, almshouses and jails just to take care of people whose natural tendencies have developed.

And so the pupil needs most explicit directions to guide him, a good, thorough manual full of directions and helps, a book separate from the textbook. For the textbook that attempts to crowd into a sentence or two of fine print the directions that may need a page or two often so confuses what was before clear that the last end of the pupil is worse than the first. And, even with the manual, farther directions and suggestions will be constantly necessary to meet special conditions as they arise.

If orderly work is expected of the pupil, then the example of orderly work must be set by the teacher. Supplies must be in readiness for the day's work and every need anticipated. Stock bottles must be clean, well stoppered and well labeled. If paper labels are used, print the names and formulas clearly and neatly with pen and ink, and coat the label, after it is affixed, with hot paraffin wax to prevent its destruction by acids, etc. Unlabeled bottles are an inexcusable nuisance in a laboratory, and in the household they have slain ten times more than the Chinese war. Stock solutions must be filtered and clean. Tin spoons may be provided at a cost of 5c or 10c a dozen for the handling of most of the dry salts. They are cheaper than spatulas and more serviceable as a rough measure. A convenient side table or shelf holds all supplies needed by the pupils for the day's work.

Let the pupil have a good complete and uniform outfit of apparatus and let him own it, then let him keep it under lock and key and be just as responsible for it as the cashier of a bank for its funds. The sense of ownership is a powerful incentive to interest and careful work. If possible let him be the sole owner, but, if not, then he should have the same privilege which any business man enjoys: that of choosing his business partner.

Let this apparatus be specially adapted and the best for its purpose, and do not ask or expect him to be interested, accurate, careful and skilful in the use of apparatus fished out of a junk pile. The best use I have for old olive bottles is to fill ash barrels. The first cost of such a good outfit is somewhat more than the junk pile, to be sure, just as the student developed by the laboratory ought to be somewhat more valuable to society than the ragpicker. But, after all, the cost of the good is not very much, and the running expense not a whit greater, since the pupil must pay for everything he breaks, at cost. Is the objection raised that such apparatus is thin and fragile? That is one of its strongest recommendations for our purpose. By all means let it be fragile. In the handling of it lies the manual training. Woe to the individual who can not turn around in a china shop without a bill for damages. His education has been sadly neglected.

Neatness, order and system are the *sine qua non* of any exact science. Teach the importance of care! care!! care!!! Never countenance dirty apparatus, slopping of liquids or spilling of powders on desk or floor. Instill some idea of what is meant by "chemically clean." While one may not go to the length of requiring the work done on spotless polished oak, yet spots should be of but rare occurrence. Let the pupil learn to be neat in person also, always protecting clothing with apron. Let him train his hands to hold a stopper properly when using a reagent bottle, to grasp the bottle, to pour out a liquid. Teach him how to get dry salts from the stock bottle on a neat square of paper, and to take no more than is necessary for his purpose, never returning any excess from his dish to the stock for fear of contamination. Teach economy in the use of chemicals, not simply for economy's sake, but because there is better training in the handling and observing of small quantities than in large. Many books direct to use from two to five times as much as is necessary.

The pupil should learn how to set up apparatus and how to plan out the connections of apparatus so that it shall be neat

and trim, not bolstered up with books or other props. He should learn how to bend and cut glass tubing, how to mend broken test tubes, how to fold a filter, how to put a glass tube in a stopper, how to put a stopper in a flask without crushing the bottom in. Teach the special use and handling of retort, crucible, flask, etc., and the reasons for this difference in apparatus.

These and a thousand more constitute the manual training of chemistry; and one not familiar with the work can hardly realize how much the pupil is in need of just this sort of training. I have seen a bright, third year pupil, when given a large tank of water and a bottle, work 15 minutes trying to fill the bottle with water and invert it without success, and this was not true of one pupil alone but true repeatedly. The person who never learns to do these little things properly is the one who in later life can not drive a nail or place a screw, who can not help himself or meet the little emergencies and petty annoyances, and who in a higher sphere will lack system and executive ability.

All honor to the man who knows much, but more honor to the man who can help himself with what he knows. Education should not seek simply to enlighten the tenant of the house beautiful, but must lead him to make the best and the widest use of his mortal dwelling.

RELATIVE VALUE OF THE QUALITATIVE AND THE QUANTITATIVE IN LABORATORY WORK

BY PROF. W. C. PECKHAM, ADELPHI COLLEGE

Laboratory work is the pedagogic fetish of the day. It might be called the scientific "cant" of the time. It has seemed to some, more conservative than others, that there was danger of exalting too highly a valuable feature of our work, by the claim that everything should be done in the laboratory. It would however now be agreed by all that laboratory work is a means to an end, rather than an end in itself, even though much that is done in the laboratory is done for the sake of the result which

obtained. At one time teachers of history and English at-mpted to use the term to designate the work of their students the library, stealing thus the "livery of heaven." Of course iis was not a legitimate use of the term since the phrase iould be limited to work which actually employs material and anipulates it to secure a material manifestation of some fact, ıd should not be extended, even in science work, to embrace ıe study of the history of some law, or the biography of some wmaker. Laboratory work is, definitely, the work of the hand uided by the head.

The speaker received his college training before laboratory ork was invented. And very good training it was, even in hysics, at the hands of the great teacher, Snell of Amherst. It nade a pretty decent kind of a scholar out of a scrub of a farmer ›oy. He therefore has scant regard for those who, having been made all that they are by the best system of the time, now turn about and cast stones at their "cherishing mothers." Laboratory work is good. It has come to stay. The new way is better than the old; but good men were made by the old method. Good students of science could be made now without a laboratory. Given a youth of bright, quick imagination, and he can learn so that, when the laboratory tools come to his hand, he will have an idea of their use. I am not advocating the method, I am only pointing out its possibility. I quote finally on this point from the preface of a recent textbook bearing the names of Professors Rowland and Ames:

> For a student beginning the subject, laboratory instruction in physics is of secondary importance. It is extremely useful and a great aid to the student in understanding the subject; but he can receive the mental training and learn the fundamental facts and theories without himself performing the experiments. Those performed on the lecture table need not be repeated by the student unless greater accuracy is desired.

If, then, there should be laboratory work, and there should be, of what sort should it be? Scientific experiments may be of four sorts: illustrative, determinative, demonstrative and

verificative. And of each sort the experiment may be either qualitative or quantitative, or may be performed inductively or deductively. This gives us varieties of experiment to be divided between the lecture table and the laboratory, admitted to both, or reserved for the investigator only.

To determine the selection of experiments for the laboratory, it is necessary to hold clearly in mind the end to be attained by the student in experimenting. If what I have already said is to any large degree true, it is evident that the establishing of facts, laws, and theories is not the chief end of laboratory work. Some might even hold that an elementary student is not competent to undertake the demonstration or the verification of a law or theory. Prof. Rowland holds this in the preface from which I have already quoted. We are all aware that the complete verification of most laws of nature is impossible, and we so teach. Even the simple law of inertia is an instance of this. It is not well then that a student should think that he is *demonstrating* a law which even Newton knew he could not demonstrate. And, should experiments be introduced which look toward demonstration and verification, the student should be made to feel that it is but a look in the direction of a demonstration and not the full realization of vision that he is having.

If now our field is narrowed practically to the illustrative and the determinative experiments for the laboratory, we are brought to our special topic. Should these experiments be qualitative or quantitative in character? If I were required to answer this question in a word, and my answer to be in the line of my practice, I should be forced to say, quantitative. I doubt if there is one simply qualitative experiment in the various courses in the laboratories over which I have the pleasure to preside.

Probably the strongest objection to a qualitative statement is that it is liable to be inexact. For example, to say that an increase of pressure on a gas reduces its volume, is qualitative, and an inexact student is contented with so much of the truth. Pressed to state how much the change of pressure and volume is which he has in mind, he can not do it. It reminds one of

Henry T. Field's famous statement, that a "half-baked scholar is simply an underdone goose." By the way, that is a quantitative statement. The qualitative work does not encourage exactness of statement to the degree that the quantitative does. Nor does it test and train the power of observation to the same extent. It is always easier to answer the question, "of what sort?" than it is the question "how much?" An instance in point. An academy recently purchased a barometer. When it arrived, the teacher of science (the poor thing probably was obliged to teach all the sciences) unpacked and set up the instrument. To her dismay, it would not come up to 30 inches. It persisted in a most contrary manner in remaining more than two inches below that mark. I may admit you to the secret in advance by saying that this academy stands more than 1800 feet above the sealevel. The teacher probably knew the qualitative fact that barometers do not always remain at 30 inches. Of quantitative knowledge beyond this she does not seem to have been possessed. So she poured in more mercury and the obstinate liquid would not stay in the instrument. She explained to her class that the barometer had been made for the sealevel, and so must be altered when it was carried above the sealevel. Her woman's wits were equal to the emergency and she pushed the tube up the scale till it read 30 inches. As this occurred only a few weeks ago in our state, the instrument is probably reading about the same now. Remedy, qualitative training might have prevented that; quantitive surely would.

A limited and judicious selection of qualitative work may certainly be allowed for the beginner. A college student should not need such work. I notice in the excellent reports of our science committees which have practically been followed in the syllabus of the regents, that such a principle was followed by them. A moderate number of qualitative experiments are introduced in physics. Such are no. 30, the relative conductivity of solids for heat, no. 31, convection currents, no. 32, phenomena of boiling, no. 43, Chladni's figures, no. 51, lines of force, no. 53, static electricity, and some others. For every one of these the

introduction into the list can be successfully defended. In reference to this work the committee say in their report (see proceedings of our meeting a year ago, page 730, at bottom) "it must be sufficiently specific and accurate to insure the learner against the inference that the facts of physics (the word science might as well have been used) are approximate; he must learn that in physics quantity is quite as essential as, if not more essential than quality. The quantitative idea must be ever present in his work." I presume there will be no dissent from that position.

If then it be concluded that the greater part of the elementary laboratory work should be quantitative, it remains to consider the method in which it shall be presented to the student. There are two methods of presentation, the inductive and the deductive. Of these the older, the deductive, has, I fear, few defenders among the talking members of our gild.

Induction is nowadays a word with which to conjure, quite as powerful a charm as is "laboratory work"; and, if any one has an attack from a doubting devil of a principal or a president, all that need be done is to hold out the holy thumb bone, induction and the saintly femur, laboratory work, and without doubt the devil will flee, leaving behind the true sulfurous effluvium. Now I must confess that I have less respect for induction in laboratory work than I have for teaching science by lecture and experiment only. I am reminded of an anecdote about the elder Dana. The old scientist was attending a lecture by his son. As he sat in the audience, two men in the seat in front of him were talking about the two Danas, not aware that one of them was sitting within hearing. At length one of them said, "Well, the boy is head and shoulders above his father." This was more than the old man could stand, and, touching the speaker to call his attention, he replied, "Yes, he is, because he stands on his father's shoulders." In this shrewd retort lies the key to the teacher's activity. He must plan to place his student head and shoulders above himself as soon as he can be boosted to that altitude. How much of the work shall be

inductive and how much deductive, is to be determined simply by the answer to the question, How can I advance my students most rapidly? It is plain that a beginner can not spend time to rediscover all truth. That is the inductive method carried to its logical limit. He would never get anywhere on the road to learning if he did attempt such a task. It may be that an Agassiz was right in keeping a student gazing at a fish in the endeavor to see something for six weeks till the fish was—well, strong! But I do not believe the game—the fish this time—was worth the candle. To make a correct unbiased induction does not lie within the power of elementary students. I do not believe the average student is any better than I was at the same point in my career; and I know that I was not competent to manage an inductive piece of experimental work while I was an undergraduate. I could have managed a whale better with a trout line. I remember a laboratory book on the "Cat," for which it was asserted that the student who had worked it through would know all biology. I quote this as an illustration of the inductive method "gone to seed." Many things can doubtless be learned from a cat; but I doubt if all the kingdoms of nature are fully represented, even in that talented animal.

One of our old time professors, Marshall Henshaw of Amherst, died last week. He has opposed the laboratory most strongly and wrongly. But his reason was sound. The trouble was that there was another possible inference than the one he made: the crude and inaccurate work of the ordinary laboratory does not lead to the exact laws of science, therefore away with laboratory work. His objection was, as you see, against the inductive method. And how can a boy or girl with a string, a lead bullet, and only an ordinary dollar watch perhaps, deduce the law for the length of a pendulum in relation to its time of vibration. To me this experiment has a peculiar value, but not in the direction of inductive reasoning. In this, as in many of our laboratory experiments, it is not the knowledge of the law that we are after, nor the certainty of a fact even, but it is the training of the eye in exactness. This and the training of the

hand in skill should be the aim in most of the work of the laboratory. The student can learn the laws and facts in other ways, but no man can acquire skill of hand and exactness of observation except by doing and observing. I once asked a student to bore some holes through a rod which was to be used as a lever. He bored them in all directions except the right one. Impatiently I said: "Have you no tools at home?" The answer was: "I believe the coachman has some in the stable." My parting shot was: "Well, then, the coachman's children will have all the brains, and their children, all the money too." That was a correct induction.

The preface of a recent laboratory book contains this sentence: "While in theory much is conceded in favor of inductive methods in science teaching, it is found in practice that the purely inductive method fails at points where it is expected to do the greatest amount of good." A reviewer of the book adds: "I think the experience of a great many teachers of science will bear him out in this statement." I must say that my solemn opinion is that, if inductive teaching is not a flat failure, it is only slightly curved.

And just here there is another, training for power! That is what they say we should do. An article in a recent school magazine has the title, "What can be done to make the study of physics a better training for power?" Will these people name any training which is not for power. Even the prize fighter trains for power. Try to think of any other kind of training. You can not find any other object of training.

Laboratory work must lead the student to such a knowledge of his powers as will give him confidence in himself when he comes to do original work. That is essentially a quotation from the preface to Kohlrausch's *Physical manipulations*. The point can not be better stated. And, if induction, as the student is able to carry it on, would lead him to think that the laws of science are at most about right, approximately true, away with inductive work in the laboratory! The laws of nature know no exceptions, they are rigorously right, and we had better have

our students attempt only to illustrate them than to attempt to come up to their perfectness with imperfect appliances.

Here then I conclude. Laboratory work should have a definite, determinate result. The student should as the result of his experiment, find out something, deduce something, conclude something, illustrate something. And within his range of power, depending on the apparatus and his mental capacity, he should come to a definite conclusion, and should know why he so concludes.

Section B. BIOLOGY

FRAMING A COURSE IN BIOLOGY FOR UNTRAINED MINDS: A DISCUSSION OF PRINCIPLES

BY PROF. HENRY R. LINVILLE, DE WITT CLINTON HIGH SCHOOL, NEW YORK

Four years' experience in teaching biology to young boys of 13 to 16 years of age would be time very largely thrown away, if it had not brought before the teacher's mind a confusing array of problems. Whether a teacher traces the origin of his mental attitude back to the influence of a university, where biology is taught too often as a science without thought of the immediate mental needs of the students, or whether the normal school has given him that pleasant frame of mind in regard to the beauty of nature with little of the substance of nature, in either case it is almost impossible for him to anticipate these problems, or, anticipating them, it is almost impossible really to meet them as long as he holds his university notion that biology is the thing to be taught, or his normal school idea that the children are to be entertained. Repeated failure with the one, and the inability to develop the child's mind with the other, after a while must incline a teacher toward trying to find out what is the matter. There are just two things the matter: first, most of us have an incomplete understanding of the child's mental equipment, and, second, we fail to adjust the subject-matter and the manner of its presentation to the ability of the child to understand. It shall be my purpose in what I have to say, to make clear the necessity of knowing just what the child is capable of, and to

suggest the lines along which the adjustment of material to mental capacity can be made.

Boys are not very young men, mentally, nor are they babies, but they are young animals with only the *capacity* to develop mentally. This is probably more nearly true of the east side boy of New York with whom I am dealing than it is of the first year boy in the majority of country high schools. In certain respects, however, our boy has the advantage in a comparison, for he is very shrewd and knowing. His knowledge of what the teacher will do or will not do is far more accurate than similar knowledge in the mind of a country boy. He is worldly wise, too, for how else can one explain that bearing of easy familiarity with the intense, nervous rush of east side life. But, in spite of his apparent brightness, the average east side boy when he enters the high school is undoubtedly more ignorant than the average first year boy in the country high school. Even a casual observer would notice the difference. This boy of ours has, as I say, little more than the capacity to develop. He has no power to express an idea clearly unless it be in the telling of a story, which he has learned. He has no power to originate, unless it be through the practice of guessing. In fact, he has few ideas to express, and the language he has learned is strangely unsuited for use in intellectual circles. There are many reasons for his faults, however. One of them is to be found in the lack of a cultured home influence. Another is the crowded condition of the grammar schools from which he has "graduated." Everyone knows that the sole interest in life in the ordinary Chrystie street or Mott street home is the getting of something to eat or to wear. Literature, science or the arts have little claim on the attention, except in so far as they bid fair to minister to these needs. And so, when the shrewd Jew or the quick Italian father sends his boy to the high school, he seldom does it in the hope that his son will thereby become an intelligent, cultured man, for he knows nothing of these things; but he does know that a man with education has a distinct material advantage in his world.

In a considerable degree, too, the home reflects the life and spirit of the street. Natural affection and unselfish interest are made to seem coarse and narrow by the ceaseless rush and grab outside. Suspicion seems to be a quality bred into boys from these surroundings, while timidity is the last expression a teacher learns to expect in the face of this class of New York boy. The boy believes that every one is his enemy, or, if everybody isn't, it is well to be on one's guard; and, it may ofttimes happen that the surly, rat-like watchfulness engenders in the teacher the determination to conquer the rebel through superior nervous force—the very worst way. It is better never to see the rat in the boy. The influences of the home and the street are serious enough, but the high school can fight against them all and win, as has been shown in scores of cases, but the conditions which I began to discuss bear on intelligent progress rather than moral development. The high school removes this boy from the crowd of the grammar school and places him in a wholly new environment, where—if it is not always the case, it should become so—he is treated as an independent being on whom some definite responsibility is to rest. He can no longer raise his voice in the deafening and deadening concert recitation, but must stand alone and be measured individually. The change is a severe one, and this fact must be taken into account with the other conditions the teacher has to recognize.

Since, then, the young student is to assume a definite intellectual responsibility, he must be supplied with material from which he may obtain a few ideas; not only that, but he must also be taught how to hold his mind to a definite proposition longer than it takes to guess, must be taught how to see and how to think. The subject-matter of biology is undoubtedly better than the subject-matter of any other science for the purpose of initiating the process of thinking on material things. My reasons for this opinion are these. First, there are in number more obvious facts in biology than there are in physics, chemistry or geography. The child has for that reason a more extended knowledge of plants and animals to begin with than he has of qualities of matter or

of chemical processes. Second, he has a greater natural interest in plants and animals, because they, as he, are alive. Third, the student can obtain a considerable knowledge of the facts and a fair understanding of the principles of biology without the need of algebra or geometry—necessary in physics, and with little need of the ability to manipulate skilfully or to think in abstract terms—necessary in chemistry. Then, for prudential reasons at least, the material of biology seems to be the most available.

We should not, however, lose sight of the question which I hope will be answered in a general way in what is to follow—the question of whether the knowledge a first year boy may gain of biology pays scientifically; that is to say, whether the facts and principles learned in that time constitute an organized piece of knowledge with definitely related parts. My preliminary answer to that question is this: a first year course can be made to pay scientifically, if, besides taking into account the element of time, the undeveloped mind of the pupil and his lack of skill, we present the facts so as to avoid the simplest nature study work on the one hand and the elaborate dissections of college work on the other.

Our opinions concerning what should be the content of a beginning course in biology differ widely, and they differ on the basis of what we think the child *ought* to know. Seldom do we consider what the child *can* know. Let us look at the question from both points of view as one, and let us limit the discussion to zoology, at this stage, for the purpose of concentration. The subject-matter of zoology is so extensive that one may frame any number of courses, and they may all be successful in their way. One may attempt to familiarize a child in a half year with every order of animals that ever existed, in some ill defined belief that he is preparing the youth to enjoy life when he gets to be a man, or the teacher may lead the child by means of the dissection of the cat or the rabbit, and the brain of the earthworm, to an understanding of certain facts in comparative anatomy; but neither of these men has more than a one-sided view of the matter. Most courses in beginning zoology, and I may say most

textbooks also, fail to consider certain essential factors, viz: first, the relative importance of topics, scientifically; second, the relative importance of topics, as teachable facts; and, third, the completeness of the course as a whole. I do not consider a course that deals only with the outside of all the animals studied a balanced course, unless it pretends to be simply what it is, part of a course in nature study; neither do I call a course that goes strongly into comparative anatomy a balanced course. Nor, from another point of view, does a course show true proportion which through its textbook gives, for example, 10 pages to the group coelenterates with one of those pages filled with an account of a certain species interesting to the author, personally, but of relatively small scientific importance. Nor, again, in a broader way, is a course correctly adjusted in its parts, if the laboratory work is not supported by critical and unifying recitations, occupying at least one third of the time. Certainly we must have passed the period when it might have been necessary to say that the knowledge gained in recitations must be tested and extended by work in the laboratory.

The second essential factor of those I have named, "the relative importance of topics as teachable facts," is of a very practical nature; not that considerations of scientific perfection and those of practical use are necessarily opposed. Everything should be taught that tends to give a clear conception of a set of facts or of a principle. It is, however, not practical, that is to say, it is unprofitable, to take any time to discuss the origin of the arthropods, the relationships of the king crab, the bilateral symmetry of the starfish, the ancestry of the lung fishes or points of a similar unsettled character. In dealing with the Mollusca, for example, time given to the discussion of such orders as the Ledida or the Arcidae is wasted, because the multiplicity of details concerning these unfamiliar and almost unimportant orders scatters the attention, and results in the formation of an uncertain conception of the salient features of the Mollusca. In laboratory work there is an enormous number of unteachable facts frequently taken up. The worst offenders in this matter are

those teachers who set a young, thoughtless, untrained and unskilled child at the dissection of the cat, or at that more heinous intellectual crime, the dissection of an insect. Of course the child will learn many interesting things; but how is that knowledge related to other things he knows about zoology? The chances are that the relation is about the same as knowing the history of the 18th century without the background of a knowledge of the civilizations of Egypt, Greece and Rome. One of the chief reasons why such unbalanced teaching is done today is to be found in the personal pride of the teacher that he should be the one who taught so much to one who knows so little.

Perhaps all of us offend against the third essential factor, that of completeness of the course as a whole. Some of us plan a course in invertebrate zoology, because the children know the vertebrates already, or because the vertebrates make too much "muss." Others of us are more interested in vertebrates, and perhaps we don't know much about the invertebrates. Some of us say nothing about the Protozoa, because it doesn't pay; others skip the coelenterates, because it is so hard to understand the alternation of generations in the hydroids, or because the children know all about coral islands, anyway. Still others refuse to work with live animals, because it is thought the discipline will suffer. All of us, though, when we stop to think of it, can see that a course in zoology must be finished—something like a work of art; else how can we expect the information the pupil has gained to be an organized unit in his mind?

Up to this point I have been criticizing others. I shall now give the data for a criticism of my own course, including my ideas of how a course in zoology may be made to aid in the intellectual development of the boy who studies it.

The work in biology in the DeWitt Clinton high school of New York city embraces four periods each week during the entire first year of the high school course. From September to about the first of February zoology is given, from the first of February to July, botany. Boys who enter in September begin with zoology; while those who enter in February begin their biology with bot-

ɘ have these fixed times for the two subsciences, because ᴦe it is decidedly to the advantage of the teaching of ɔ have it come in the spring, and quite as well to have :ome in the fall, since the forms with which we think it egin the work in zoology are then alive. The results ex- ·om the work of the boys in zoology or botany is deter- ᴦ the length of time they have been engaged in work of :acter. We expect more of a second term boy in zoology expect of a first term boy in that subject. In the lab- vork we study the following animals in the order given: ıopper, 2) butterfly, 3) crawfish, 4) earthworm, 5) sand- ɜreis), 6) mussel, 7) sea anemone, 8) paramecium, 9) fish. e noticed that certain types are omitted in the list, viz: ge, the amphibian, the bird, the reptile and the mammal. time decided the omission of the sponge. The fish was :d in a measure a substitute for the amphibian. The e study of the internal anatomy, at least, of the bird, le and the mammal is impossible in beginning classes 40. To supply the deficiency caused by the omission of ɜr vertebrates, I have in course of preparation a scheme tudy of the habits of birds and the habits and external : of mammal pets, such as cats, dogs, squirrels, etc. It that in the course of time those interested in the de- ıt of nature study will take up the extensive study of l familiar mammals, thus giving to the secondary schools, ıditions being favorable, the opportunity of making their ɪre intensive, but that moment may come a long time

ne given to the forms mentioned in the list of nine varies e week for paramecium to three weeks for the craw- four weeks for the fish. The time allotted to each topic the time set aside for laboratory work and the time for ns. The total time for recitation through the half year ׀y more than one third the entire 80 periods. The lab- work always precedes the recitations on a given type for reasons. With animals like the crawfish, the earth-

worm, the sandworm, and the fish, all of which may be studied in the living condition, the laboratory work has three stages: first, there is careful study of the prepared specimen under the guidance of directions and questions; second, usually a single drawing is made; and third, there is farther examination of the animal, this time a living one, with a report on the method of locomotion, the method of breathing, the circulation of the blood (in the worms) and the response of certain sense organs. In work on the living animals every appearance of cruelty is avoided.

Perhaps the first criticism that might be made on this course so far as explained is that it does not follow the so-called logical order, that is, it does not begin with the Protozoa and end with the highest form studied. There are two reasons why such a plan was not followed. First, the pupils would never have heard of Protozoa, and hence could not be expected to have a definite interest in them, though they might stand in awe at the first sight of them; and second the idea of a cell is beyond their power to comprehend, bearing with it, as it does, the attendant idea of a single unit performing several functions. It is easier to think of legs for running, hands for grasping, fins for swimming, and a mouth for taking in food. Consistent with the idea expressed in an earlier part of this paper, the idea that the material of biology is valuable for educational purposes because the child is acquainted with it in a measure, and is interested in it naturally, it seems to me but logical in the best sense to begin with the grasshopper, the butterfly and the crawfish. There is another consideration outweighing either of the two just mentioned, and that is the comparative simplicity and ease of examination of the grasshopper, the butterfly and the crawfish. In view of the fact that the purpose of a course in biology is to furnish the mind with the substance for new ideas, what would be more necessary than that the facts should be easy of access and clearly detailed? We place the Protozoa near the end of the term, when it is thought the boy should have a fair understanding of the meaning of comparative morphology and comparative physiology.

The fish is placed last, since dissection requires a considerable degree of scientific interest and concentration of mind. The other forms are given their order partly on account of the availability of living material and partly on account of relative structural simplicity.

A word now in regard to obtaining practical results from laboratory work. It is a very common method of procedure to give a student a specimen and tell him to find out what he can about it and then draw it. The story of Agassiz's student and the fish is very interesting, but the idea contained in it, like many another college idea injected into high schools, is very discouraging to youthful willingness. Then there is the other extreme represented by the man who writes laboratory manuals. He says, "note this," "note that," "note the other". Of course the boy, if he knows his business, will note them all. And then the man asks questions in such rapid succession and in such endless confusion that the student may well wonder whether the author intended the book for use or wrote it to show how many questions he could ask. It seems to me that every teacher, if he has any ingenuity at all, ought to see in the first place that the Agassiz method is the wrong one in secondary schools, and then he ought to plan his own laboratory work, because the conditions in his school are, in all probability, different from the conditions in any other school. In my own case, I give far more consideration to the questions I put on the board for the boys to answer than I do to the marks I give them in examinations. My reasons for care in this matter are many. I want the work to be directed along profitable channels. I want this part of it to constitute a unit in itself. To accomplish that, the set of questions is made to begin definitely and to end definitely, the separate questions being related as much as possible to one another. Here and there among the questions are notes containing bits of information or directions to help the pupil over obscure points. The general purpose of the comparatively few questions, eight to 15, is to draw the pupil out and to make him feel, when he is through, that he has accomplished a not un-

pleasant intellectual task. In the answers I hold the boys to clearness and ease of expression, besides refusing to accept a paper that is not neat in form. When the set of answers, or the report as we call it, is written, the boy can be supposed to know something about the structure of the animal. The drawing can then be undertaken with understanding. I consider the drawing somewhat more important than the report, because vagueness or inaccuracy of understanding might pass unnoticed in the report and be detected instantly in the drawing. Sketchy drawings are not permitted, neither is shading, because one induces carelessness, and the other serves to cover up faults of detail. Sharp, diagrammatic outlines with modified yet clear details, may constitute a record of absolute accuracy.

With a fair understanding of the structure of the external organs of the crawfish, for example, the pupil is provided with a live animal in a tray of water. With 40 boys in a class, one may well say the fun now begins. Perhaps it isn't well to think seriously of discipline at such a time, unless we seek an early grave, but business is business, as the boys soon learn, and after the first few pinches, and the exhibitions of mock terror, the order "to work" brings every one into line with something like nervous anticipation of the "experiments," as they call the live animal work. Such observations as these are made on the crawfish: an analytic study of the order of movement of the legs; a study of the external evidences of breathing by showing the inward flow and the outward flow of currents of water with carmine; an examination of the movements of the telson and the swimmerets in swimming; and the movement of the mouth parts as an evidence of tasting beef broth. At no stage of the laboratory work has it ever appeared necessary to do things to "interest" or to "entertain" the pupil. Every indication seems to point to the conclusion that a child can have an intellectual appreciation of carefully planned and profitable work as readily as an adult can appreciate it. All the deliberate planning to interest the child in the beauties of nature is in my opinion time uselessly consumed. If we strike at broad intellectual development, the love of beauty will follow naturally.

s at present unfortunately true in most schools that much time of recitations has to be given to supplying the deficien- f the textbook. It is also necesary to interpret the text- when any sensible person would think the textbook ought self-explanatory. The function of the textbook should be in the spaces between the ideas obtained in the laboratory o focus the mind of the pupil on essentials. If a textbook be written with care, simplicity and completeness of its the teacher would be relieved of the task of joining ideas her and elucidating statements, and could give his energy proper work of a recitation, which is the use of well stated and principles for the purpose of inspiring clear thinking ontinued study.

f. **W. J. Beal**—As I mentioned yesterday in my paper, I have 25 years doing my best to help plan a course of study in- ig a course of botany, but we have been obliged to change y, or every once in a while, to accommodate the new ideas come in by introduction of new members in the faculty, going out and others coming in, and I have given up the em as one that will never be settled. The existing faculty djust studies according to their own ideas, and I presume s the way elsewhere. There will be constant fluctuations, he different states and universities will have their own . For me to attempt at this time to block out what would a suitable course in botany for the state of New York l be folly.

f. **C. G. Rogers**—I would like to ask two questions of Dr lle. Do you find it possible to secure from the pupils iate work on Vorticella in the laboratory; and how far l you carry work in homology on crawfish?

f. **Henry R. Linville**—In the work on Protozoa I have not iplished very much, I must acknowledge. I do not give

much time to work with the compound microscope in zoology; I give more to microscopic work in botany. The boys have one week for the study of the Protozoa. In that time they see living paramecia through the microscope, draw from charts (which is exceptional) and have recitations on the group.

I have attempted for three successive years to get satisfactory results from the study of homologies as illustrated in the appendages of the crawfish, but the outcome has not been fully satisfactory. The reasoning involved seems to be somewhat beyond the capacity of boys at the age of those of whom I speak.

Inspector Arthur G. Clement—I have had a little experience in this matter of courses of study in New York state, and I have had some such experience as Dr Beal refers to. There are different kinds of teaching in the different schools, and it is very hard to secure a uniform course. As I have prepared the papers for the examinations for the 600 schools in the state of New York, you can imagine that it is quite an effort to prepare a satisfactory paper. There are some schools that take up their zoology by beginning with the protozoans and studying that class first and then going on from the lower to the higher class, endeavoring to show the increase in complexity of structure as they advance. There are other schools where very little effort of this kind is made. They begin the study with the dissection of the frog or crawfish, and afterward study the lower forms. Still other schools will study only external features. So to prepare a paper that will cover the different kinds of teaching is quite a task. We have solved it in this way: we prepare a paper of 15 questions, and no school is required to answer more than 10; and, if any school attempts to do dissection and microscopic work to any great extent, 20 credits on the examination are allowed, provided the students submit good notebooks. As there are usually two or three or four questions involving dissection, others on life history, others on homologies etc., all are usually satisfied with the paper.

ZOOLOGY IN SECONDARY EDUCATION

BY PROF. JACOB E. REIGHARD, UNIVERSITY OF MICHIGAN

[Paper read but manuscript not received at date of printing.]

Prof. J. H. Stoller—We have all enjoyed this paper, we appreciate its scientific grasp, and all want to read it when printed. I regret that there is very little time for discussion. If there are any who wish to speak briefly on the paper we shall be glad to hear them.

Dr F. W. Barrows—It has occurred to me that one other phase of the value of biologic studies in secondary school work may possibly be worth mentioning. We have spoken of their culture value, we have spoken of the value of exciting an interest in nature and love for nature, as is done by proper nature study, but, in addition to this, we might inspire in our schools a *respect* for the science, something a little different from any of the motives just mentioned. I wonder if it would not be possible to present to the pupils the economic side of botany and zoology, so as to give them a very much higher respect for the work that they are doing than they usually have. Can we not make use of collections selected to illustrate some of the very valuable work done by the state and national governments in this line? Can we not also make use of some of the published reports of our state agricultural boards, state entomologist, zoologist, United States fish commission and various other United States commissions? I would like to know if any one here has seen any publication on the economic results in zoology and botany which is worth recommending as a help in secondary education.

Inspector A. G. Clement—I wish to express my great pleasure in hearing this paper. It certainly has been a notable one, and I will speak of some points which impressed me; the points brought out with regard to the methods of physical and biologic sciences respectively. It seems to me that they are decidedly different, and the educational value of these two subjects depends largely on the method. The method of physical science

is what might be called the experimental, while the method of biologic science is the comparative or evolution method. The full value of zoology is not obtained unless the student gets a thorough insight into the theory of evolution. I specially like this idea of the paper, getting the method in biology so thoroughly as to be able to apply it to history, to literature or to any line of thought which one wishes to carry out. One can not understand psychology and pedagogy as now taught without understanding zoology.

Prof. Henry R. Linville—In reply to Prof. Barrow's question, I wish to say that the economic aspect of biology appeals to pupils on account of its practical use; but I should not say that respect for the subject of biology comes through interest in the economic aspect of it. Respect comes rather because the subject as a whole is well presented; and because the subject is made to seem through the facts and the principles underlying them to be worth the pupils' while.

I should qualify one statement which Prof. Reighard made in his paper, to the effect that biologic training is better than the training a physicist gets. It may have been in the example he gives that the biologists were broad-minded men naturally, and the physicists narrow men naturally. I have known biologists who were very narrow and physicists who were very broad. The difference between men of different or even of the same line of study depends on more than one factor. Most prominent among the factors that should be taken into account in judging men are their natural ability, the quality of their training in their special line and the extent to which they have an acquaintance with other lines of thought and experience.

Another matter which I should like to discuss now is one which Mr Clement mentioned. Instead of offering so many chances for a boy to pass the examination in biology, there ought to be an effort to test his knowledge of the subject. I know from personal acquaintance with candidates that boys who have received the 48 counts in the regents examination have been admitted to the Cornell medical school. Now, they

were admitted because they received those counts and not because they were prepared for the work. It seems to me that, if the regents stood for unifying and systemizing the work of education much more than they do now, the result would be more helpful to our educational system than their present methods promise.

Inspector Clement—I beg to disagree with my friend. I think that, if we were to present an examination which was always along a certain fixed line, there would be a reaction against the study of botany and zoology. The equipment of the schools is so different, the preparation of the teachers so varied, that, if we were to insist on a certain fixed line of teaching, there would be objections throughout the state. The regents are not autocratic. They are willing to allow for the greatest breadth in teaching throughout the state. In fact, they are compelled to; otherwise, they would hear something from the schools. The schools would say, "Very well, we will withdraw." We are gradually working toward a course, but it is utterly impossible to insist on a certain fixed course in every school at the present time.

Prof. Linville—It seems to me the situation is something like this. When the board of regents accepts the work of the boy and grants him the 48 counts, it puts the stamp of approval on the knowledge the boy has. It would appear that the boy had sufficient knowledge to enable him to enter the Cornell medical school with advantage to himself, but boys soon learn in many cases that they are ill prepared for such advanced professional study. If the regents examinations were real tests, they would give a correct and not an incorrect notion of what a boy really knows.

Section C. EARTH SCIENCE

THESES ON GEOGRAPHY

Prof. Frank M. McMurry—1 The basal units of geography should be taught far more fully than has heretofore been the case.

2 The proper presentation of these units calls for 1) numerous excursions; 2) type treatment of topics.

3 The type treatment of topics provides for much more frequent and effective reviews than have been customary; a provision highly important.

4 There is an extensive causal sequence of facts in geography, the beginning point being physiographic and climatic conditions.

5 Type treatment and causal sequence of topics throw much emphasis on the relative value of facts; but more attention still must be given to this matter, for perspective is woefully wanting in the geographic knowledge of the schools.

Prof. McMurry discussed each of the foregoing theses.

Inspector C. F. Wheelock—I confess to being somewhat surprised by Prof. McMurry's statement that basal units are not taught. So far as my own observation and experience go, I am led to believe that teachers are giving special attention to that very matter. In a large majority of the schools that I see, teachers are continually collecting material which shall aid in giving the greatest possible degree of reality to those preliminary notions. I certainly think that the facts are not so serious as Prof. McMurry has been led to believe.

Sup't Jay Crissey—I think Prof. McMurry has just stated what is true; and, in addition, that it is well nigh impossible for the children to grasp these basal units till they come in contact with them. In a mountain section it is easy to teach what a mountain is, but a child will not understand the opposite formation. Some years ago I taught a sixth grade in Chicago, in Col. Parker's school. Geography is taught there in as good a manner with as good aims and purposes as I ever had any conception of its being taught; yet these children on the prairie have very little idea of a mountain. They could tell that it was a large hill, and yet, when they came to be questioned, they had no conception of a mountain with its sides seamed with ravines, its streams of water, its forests and vegetation. Often the teachers failed to realize the necessity of these units being understood by the children.

The first of last month I was talking to an institute with regard to studying outdoor forms right about the schoolhouse and using them to build up ideas. I sketched a hill on the blackboard and made a contour map of it. Soon a teacher asked me if I really supposed that a child ever came to school who didn't know what the map meant. I said, "I believe most of the teachers here do not truly interpret maps." I illustrated by the country from the St Lawrence river to New York, following the line of Burgoyne's march; I asked the teachers to put down lines, one after the other, which would mark the profile of that march. Then I put on the board the correct diagram, and turned to the teachers and asked all who were wrong to hold up their hands. Nearly all were wrong in some particular.

Prin. Frank Carney—I would like to state a brief method of teaching the soil which one of the teachers of Yates county tried at my suggestion. He removed some residual soil to get down to the shale rock, took a small quantity and pounded it up fine, placed it in a tomato can, planted some beans in it and kept it on a stand where the pupils could see it. They saw that the beans grew, that the soil had been made from the rock; I think they got a practical idea of that one geographic unit.

Prof. Grant Karr—As regards the type theory I do not feel free to say much, because a man who is working in geography specially, like Dr McMurry, ought not to be confronted by a mere schoolmaster; but the matter as presented might possibly be compared to the alphabet method of teaching reading—taking small and to the child unimportant matters out of their relation and making them the chief thing. It is a question whether these types as such should be taught in the lower grades in a formal way. Would not such a procedure go beyond their powers of analysis and generalization? I do not see how children in the third and fourth grades can get a conception of a city which would be complete enough for future use. Such a type must be left unfinished and kept growing for some time. It is not an

easy matter to explain definitely what a city, a town, or a farm is. To say just what a city is requires a great deal of thought on the part of the person describing it, if he have a great deal of experience, and the elements can not be undrstood till the person has had much experience and practice in making generalizations. A young person goes into a town in much the same condition as Yankee Doodle was—unable to see the town for the houses. He has not really a general notion to make up a type of a town till he can think the matter out of its elements. This may be one objection to the type theory.

R. H. Whitbeck—I am sorry Dr McMurry was able to give the fourth topic so little discussion. I think it would surprise many students of geography and some teachers if they traced out the *causes* of some of the great facts in geography. A single case will illustrate. We teach that New York is the Empire state, first in commerce, first in wealth and first in population. Ask a pupil *why* this is so; ask a teacher. He may tell you—he may not; perhaps he has not thought so far as that. Are you aware that 90% of the wealth and and 80% of the population of New York are found in a relatively narrow strip of land bordering the Erie canal and the Hudson river? Here then is a suggestion of the cause of New York's greatness. But why was the Erie canal built in New York and not in Pennsylvania or elsewhere? There is of course a reason for it. There is in the eastern mountains south of the St Lawrence river only one gap and that is in New York. The only opening through which could be built a canal to connect the interior of the continent and the Atlantic seaboard was in the Mohawk valley. And why is the gap there? We find that, toward the close of the glacial period, the Great lakes were compelled to drain through the Mohawk valley. A gorge was cut through the mountains at Littlefalls by this river, and the subsequent building of the Erie canal became possible. The Erie canal was the great factor in giving New York state preeminence. This is an illustration of the causal idea in geography.

PERSONAL EQUIPMENT OF TEACHERS OF GEOLOGY AND GEOGRAPHY

PROF. ALBERT P. BRIGHAM, COLGATE UNIVERSITY

It is recognized in this paper that the teacher of science in the secondary schools is usually burdened with many subjects. Our suggestions, therefore, must be moderate if they are to be helpful, and we must seek to set up practicable ideals. Notwithstanding the demands of science teaching at the present day, no teacher should be daunted by lack of early training. With interest in nature, and due use of the opportunities which offer themselves, some parts of the field can be well covered. It is not so important that the teacher know everything as that his interest be genuine and his knowledge vital so far as it goes.

Among the essentials of the teacher in our special province is some measure of experience in the field. It is our most important laboratory. The teacher must know how to observe, and take notes out of doors. One can learn to observe only by observing. If this can be done under direction, it is well, but, if it must be alone, the results, in spite of limitations and blundering, may be even better. No better phenomena can be taken than those of the glacial drift. They will often be puzzling, but they will compel thought and be fruitful. Record all possible facts seen in a section of gravel and sand or of boulder clay. The causes or relations of what you see may not appear. Do not be disturbed by this. Go on to another section, and observe and record in the same thorough manner. You will soon find yourself comparing, contrasting and theorizing. Then you will go home and begin to read all that you can find on the subject. When the teacher has reached this stage, he will scarcely need formal instruction. The habit of science will have been acquired.

I do not hestitate to advise the verification in the field of the observation of others. It is not original work, but it will lead to independent inquiry, and often open the way to new problems and to valuable observations over local areas. This leads me to refer to a remark of Sir Archibald Geikie on what we may call the democracy of the science of geology. The same is true of geography. The highest training is not too good for either, but

much may be done with something less. Here witness the long roll of amateurs who have made honorable contributions to the science of geology. The careful study of local geologic sections and the exhaustive gathering of their faunas or floras, is one field for such work. One need not be an accomplished paleontologist or have large experience of field methods in order to do this in a region of simple structure. So also descriptions of local physiography may be of great value. For the greater part even of our older states such descriptions do not exist, and here is open a wide field of interest for teachers. The results in personal satisfaction, in teaching power and in scientific production are beyond measure. Such work carried on even imperfectly, or in isolated fragments of time, will infuse power into all school duty and impart a truly professional dignity to the teacher's vocation.

Closely related to our plea for field work is the emphasis which we now place on full knowledge of some phase of our subjects. What should be chosen for such intensive study will depend largely on circumstances. It will be of great use to know thoroughly any local industry which is based on geology. All industries belong to geography or have geographic relations. To put it concretely, a teacher in southwestern New York might well seek to be thoroughly versed in the oil industry, its history, its distributions, its methods in the field, and the refining and marketing of its products. Before going far the teacher would find himself deep in the geology of ancient formations on the one hand, and on the other ranging broadly the field of human interests. Similarly, rock salt may be taken up by the teacher in western New York. The Great lakes and their commerce would soon involve one in the study of ancient formations, in fascinating problems of physiography, in the movements of early discovery and in the industrial development of a continent. Building materials, the glacial drift, and the founding and growth of cities, are other obvious subjects of great interest. A full, rich, and, as far as possible, first-hand knowledge of any one of these subjects will free all the teacher's information from the flavor of

bookishness, and it is not an impracticable ideal, requiring only purpose, and some centralizing of attention for a period of months or years.

What we may call the fellowship of science should be fostered by every teacher of our subjects. No teacher, however ill prepared or diffident, need be cramped and discouraged by isolation from his fellow workers. In the cities are many local academies of science, historical societies, or literary clubs which are hospitable to scientific studies and contributions. The writer's first published paper in geology had place in the transactions of a historical society. Fresh knowledge of the home locality always finds a welcome, not only with pupils of a school, but with intelligent patrons and thoughtful citizens of the community. This association exists largely for the purpose of scientific fellowship, and, it is to be hoped, may lead to much interchange of thought and of the materials of teaching. Particularly should this be true as between the schools and the colleges. Departments in colleges should be used by the schools, and the instructors in such departments should be freely called on for such information or other assistance as they may be able to render. The American association for the advancement of science is not a monopoly of specialists, but in its general membership is designed for all who have interest in the study of nature. Its annual dues of $3, now include a year's subsciption to *Science*. In many cases the school library might meet the annual charge, receiving the periodical and giving the teacher the benefit of the membership. The American bureau of geography, having its headquarters at Winona (Minn.) should also receive the attention of teachers of this subject. Its quarterly bulletins are full of useful papers, and arrangements are made for interchange of material. The cost is but $1 a year. In one or more of these ways the teacher may realize the invigoration of personal fellowship and greatly enlarge his personal satisfaction and his power.

The teacher should not fail to accumulate some store of literature, either as a private possession or as a part of the school library. The writer has elsewhere given an outline of suggestions

of this nature for geology;[1] and good bibliographies for high school work in geography are now easily procured. In addition to such periodicals, government reports, textbooks and other works as are available, it will be found useful to gather out of current periodical literature, accounts of geologic and geographic facts and occurrences. When one directs his attention thus to the magazines and daily press, one will find a surprising abundance of such material, which is always used with vivid effect in the classroom. This has never been more fully true than now in our own time, in the opening to knowledge, interest and action of so many obscure or remote parts of the earth.

THE PURPOSE OF GEOGRAPHY

BY PROF. AMOS W. FARNHAM, OSWEGO NORMAL SCHOOL

The purpose of geography must be in harmony with the purpose of education. The purpose of education is to aid in stimulating and directing the child's native energies and impulses in such a way that the best possibilities of his being and doing may be realized.

Some definite idea of what geography is must be arrived at, before its purpose can be defined. Geography, as a subject of study, is a system of thinking organized on a fundamental idea. This fundamental idea seems to be man's physiographic environment; its origin, development, and influence on his life. Geographic elements have been and are of value to man in accomplishing his purposes. They have also furnished impediments to human progress and development, of various degrees of strength. It is the purpose of geography to take into account all physiographic elements, in a related way, which are of use to man, and also those which hinder his progress. How then shall the purpose of geography be realized?

Man's physiographic environment is made up of different land and water forms of different origin and different stages of development; these forms, with their attendant fauna and flora, exert different influences on his life; and they are put to different uses

[1] Suggestions to accompany a textbook of geology. 20th century series.

ıplishing, what seems to him, valuable ends. These dif-
ırms appeal to him differently, causing feelings of admira-
isfaction, awe, fear, according as his mind may be affected
rience, necessity, superstition. The child's feelings de-
l by his environment should be directed toward knowing
ronment. At first he considers the various earth forms
strict more in the light of sources of enjoyment and means
ınt employment. He has not looked on them as furnish-
erials for food, shelter and clothing, either directly or
y, because these physical needs have been satisfied by
whom his care has been intrusted. The hill which has
mbed for the joy of climbing and for broader outlook,
nish material for the study of all vertical forms. Its
ıry in length and steepness, and therefore vary in their
retain moisture and soil elements. The different slopes
erent exposures to sunlight. The vegetation of the hill
different slopes and on different parts of the same slope.
ǝtation varies in number of species and in quantity and
of each species. Then a relation is found between vege-
ıd animal life. The life of the hill observed during the
serve to illustrate the phenomena of life under different
influences. The meadow which has been the theater
ic sports may have even greater interest when considered
ght of its origin. The meadow and hill together illus-
relief of the child's district, and furnish basal ideas for
y of all relief.

child has discovered for himself the power of running
turn wheels; also its power to float objects on its sur-
e has learned something of its force in the destruction of
He needs but a single word that he may observe its
power in the deepening of its channel, and the process of
the shallowing of the more quiet portions of the stream.
the life of the brook is studied, and its life compared
of the hill, children find striking differences that awaken
f inquiry. Why can some animals live in water and not
Why can some live on land and not in water? Why

can some live both in water and on land? Why can some plants live only under water; others only with their roots in water and their stems in air; others still wholly out of water? A likeness between plant life and animal life is here discovered, and the characteristic structure of plants and animals is found to be suited exactly to their life habits.

The streams of the child's neighborhood, no matter how small, and the ponds as well, illustrate the drainage features of his neighborhood. When the relation of drainage features to relief is considered, it is discovered that drainage is modifying relief and that relief in turn is modifying drainage, since relief determines the direction, force, velocity, and length of streams. It is apparent that relief and drainage determine human settlement, human industries, and lines of human intercourse.

Children who get their basal ideas of geography from contact with the earth, receive more than purely intellectual knowledge. They get material for the exercise of the emotional side of their natures; for in the study of the hill and meadow, the brook and pond, the field of grain and the lowing herd, as objects of geographic interest, the learner instinctively observes something else that lies beyond and above the purely intellectual. He observes the graceful outlines of the hill against the sky, the meadow framed in goldenrod and flecked with marguerites, the rhythm of running water in a pebbly bed, the restful pictures of the crystal pond, the billowy grain and patient kine. Then each of these becomes a part of one harmonious whole, and the landscape broadens to the horizon. He looks upward and cloud scenery against an expanse of blue greets his vision. He observes the myriad colors, both strong and delicate, in their varying shades. The odors of springing vegetation, of flowers, fruits, and "new-mown hay," attract and interest. He hears the sound of wind and bird and bee. The unbreathed air invigorates his whole being. All of these qualities of nature that do not enter into direct geography teaching, and can not when the earth herself is not approached and studied, appeal to the higher nature, refining and elevating the child. While the wholesome exercise of the

emotions plays an important part in the development of moral character, it should be remembered that on their exercise depends largely the success of all intellectual training.

It is one purpose of geography to show the intimate relations between earth forms and climate; to show that earth forms modify and even make the climate of a given place; to show that the climate of a given place retards or hastens the development of the earth forms. But the effects of climate are more readily seen in the life of the place, specially in the plant life. The climate of any zone may well be illustrated by the weather of almost any temperate latitude district. For example, a summer drouth causes scarcity of ground water, which in turn affects vegetation, domestic animals, and local commerce. A drouth that makes "short" pastures affects dairy products. When meadows are dried, a small amount of inferior hay is harvested. When growing grain is checked by drouth, there is a small growth of straw, with many shrunken kernels. Drouth at certain seasons causes some fruits to fall and others to ripen prematurely. Then some products that can not be dispensed with find a ready sale at an advanced price, though of an inferior quality, because the supply is not equal to the demand, and there is no satisfactory substitute. Again, some products of inferior quality can not be sold at a price that will pay for their marketing, because they have substitutes that are more satisfactory. When the learner comprehends with clearness and intelligence what drouth is, and in what way great heat and little moisture affect vegetation, springs and streams, and just what these effects are; and also how these effects affect animal life and local commerce, then he will be able to understand what are the permanent conditions of an extended area having continued drouth year by year, notably the Sahara. And at this time the influence of continued drouth on human settlement, industries, commerce, and civilization may be comprehended.

It may be said that one purpose of geography is to show how man in a measure has freed himself from physiographic control by modifying the physical influences about him. In regions of

unestablished drainage man has supplemented artificial drainage. In arid districts, by means of irrigation, the desert has been made to "blossom as the rose." Some idea of the diversity of agricultural conditions within the limits of a single state may be gained from the fact that there were held within the borders of Texas a few years ago, at nearly the same date, a drainage conference and an irrigation convention. One was at Galveston and the other at San Antonio. Some persons were thus studying means of lessening the amount of water over a large area, while others sought to increase it, or rather to make its supply for agricultural purposes more regular.

In localities not well supplied with wholesome water, artesian wells have been made to furnish inexhaustible quantities. Man has bettered his climatic conditions by protecting the forests of slopes and destroying the forests of swamps. All this may be regarded as having an intimate and vital relation to the social, industrial, commercial, and through these to the moral life of the people, so that, one might say, a purpose of geography is to reveal the influence of environment on human life—not material influence only, nor commercial influence, but esthetic and, indirectly, ethical as well.

The child's nature in its feeling aspect is developed by geography along the line of love of home. Home consists of many elements, chief of which is the love of father and mother, and friends; but these have a physical setting consisting of houses, streams, forests, industrial pursuits, etc. Love of home deepens and widens with the life of the child. It begins at his father's fireside; then extends in widening circles, including larger and larger areas till the outermost circle coincides with the boundary of his country. Then home and country become synonymous, and love of home becomes love of country. Love of country is strengthened and perpetuated through knowledge of one's country. When the American youth learns from geography the extent of his country, its resources—mineral, vegetable, animal, and manufactured, and when he compares his country's extent and resources with the extent and resources of any and all of the

great countries of the world, he realizes of a truth that the lines are fallen unto him in pleasant places; that he has a goodly heritage.

Geography greatly influences and largely determines man's thinking and doing. History is a record of his thinking and doing. Geography is the body; history the soul. Geography supplies the knowledge of the means for accomplishing human ends.

Section D. NATURE STUDY

BIRDS IN NATURE STUDY

(Abstract)

PROF. ELON H. EATON, BRADSTREET'S PREPARATORY SCHOOL FOR BOYS, ROCHESTER

The rapidly increasing study of birds and bird life is due in part to the general awakening of interest in nature; but there is also a widespread feeling that the numbers of our native birds are decreasing rapidly, and it is only by instructing the rising generation in the value of birds and the ways of protecting them that we can hope to preserve the varied, beautiful and highly beneficial species which are disappearing before the onward march of railroads, telegraph lines, plate glass windows, electric lights, milliners, wood-choppers, ditch-diggers, English sparrows, murderous boys and untutored men.

There is however a great inherent value in bird study. Children are interested in life, and birds are the most alive of all animals. Their highly specialized structures and life activities, their motion, song, language, arts, architecture, community interest, travels and personal traits are highly suggestive to the youthful mind. In this department of nature study there is also a chance of directing the dawning moral sentiments which can not be neglected. To tell children that life is sacred and nothing that lives should be killed is weakly, sentimental, irrational and contrary to the laws of the universe. Boys should be taught why, when and what to kill; not, never to kill.

The teacher of birds must know not merely technical biology but also the natural history of birds; and teach the general

structure, relations, habits, food, song, flight and special adaptations of the different families and the common individuals of each family. Let the boys and girls become acquainted with our bird neighbors and their occupations. And when they know them as well as their own friends and recognize them as easily, they will become good bird protectors.

NATURE STUDY AND THE GRADE TEACHER

BY ANNA BOTSFORD COMSTOCK, CORNELL UNIVERSITY

Success or failure of nature study in the immediate future lies with the grade teacher; for, if it is to be introduced as an integral part of our education, it must reach the pupils at last through the ministrations of the teacher in the graded schools. It is true today that comparatively few of the grade teachers are properly trained in nature study facts and methods, and this in itself seems discouraging. However, it has been our experience that teachers in the public schools of this state devote themselves unselfishly and nobly to their work. They do not question whether a new measure means more work for them. If they believe it is a good measure, they will adopt it, however much it may cost them in extra labor and care. No doubt the extensive courses of study given in most of the nature study manuals have discouraged the untrained teacher in the past. She does not see how she can teach so many things unless she takes time for a college education, which is usually out of the question. As a matter of fact, it is not necessary that the teacher be extensively trained in science in order to teach nature study successfully. The real solution of this question lies in the teacher becoming interested in some special line of study that shall connect the indoors of the schoolroom with the out-of-door life. She may become interested in birds, in insects, in animals, in flowers or ferns, or in the study of the clouds or rocks. If she learns to care for any one of these subjects and calls the attention of her pupils to it in a sympathetic manner, she has done more for the child from the real nature study standpoint than if she had taught him the whole gamut of

nature study in a perfunctory manner. It is much better to teach a very little in nature study well than it is to teach superficially very much.

The main object of teaching nature study at all is to stimulate the child's interest in his out-of-door environment and lead him to a true understanding of the wonderful ways of nature; and nothing so quickly eradicates from the child all interest in out-of-door life as to be obliged to commit to memory many facts observed by others.

One hopeful thing in the outlook for nature study is that the grade teacher may find it a great help in her other work. She may correlate it with reading. However, it will be of no use to her in this unless she be wise enough to let the pupils make the observations from nature first and then let them read what other people have observed concerning the same things. To read about an object before studying it robs it of all interest so far as the child is concerned. Specially will the teacher find nature study helpful in the work of drawing. If the child is interested in drawing at all, he likes to draw something about which he knows, and prefers to draw from nature rather than to copy from a book. So too with the language work. If the child must write about something, he prefers naturally enough to write about the thing he has studied. Not only does he prefer to write about this, but, as a matter of extended observation, we find he writes better English on such topics than on those which draw on his imagination purely. The teacher of geography today is obliged by modern methods to teach more or less of nature study, and, if she is interested in this line of work, she will find many ways of vivifying the child's geographic knowledge by this close contact with nature. From every side we have evidence that, above all, nature study is helpful in preserving discipline in the schoolroom. The mischievous child has at last something in which he is interested; something in which his teacher is a fellow student; and this sense of companionship has proven the greatest aid to the teacher in maintaining her control over her difficult pupils.

It is not necessary that the teacher give a great amount of time each day to nature study. Indeed, very much of it may be done without any lessons at all during school hours. With aquariums in the windows, with cages containing insects and animals in the schoolroom, and with window gardening, the teacher will find that the children will learn the things for themselves if they have the opportunity of watching. All she needs to do is to give sympathetic and intelligent attention to their observations.

NATURE STUDY IN PRACTICE

PRIN. E. J. COBB, BUFFALO, SCHOOL NO. 60

When the leader of this division asked me at a late date for a paper on the practical side of nature study, to be presented before you, the past masters, as it were, of the subject, I hesitated about complying, thinking that anything I could say would surely be old and threadbare to those whose life work is the study of nature. However, I decided it might not be out of place to tell a little of the "old, old story" as it has appealed to me, a student, in my attempts to apply the subject with school children, in the vacation schools and also the public schools of Buffalo.

In these days when "fads" are charged with all the evils "flesh is heir to," the question is often asked with reference to nature study, "Is it a practical thing, or is it theoretic—a fad?" So much has been said and written about the subject, often contradictory and often erroneous as to scientific facts; so much has been done and proposed to be done, that thinking people believe to be the veriest nonsense, that it is no wonder parents and friends of our schools ask us, and justly, to explain how we expect to benefit the rising generations by this, to them, new subject. We as educators know the subject is not new, and that very little of a new character has been proposed or written. It is only an old, old friend, masquerading under a new name, with new clothes and rejuvenated being. The Great Teacher taught by appealing to the concepts gained through nature study, and made his teachings practical by establishing a close relation between the natural object and the life of man. "Consider the lilies of the field, how

grow; they toil not, neither do they spin: and yet I say unto that even Solomon in all his glory was not arrayed like one iese." Again he said: "Behold the fowls of the air: for they not, neither do they reap, nor gather into barns; yet your enly Father feedeth them. Are ye not much better than ?" The poets have always taught through nature, and have e the subject of practical value by leading men to see its ities and relate its every phenomenon to their lives. Shelley's *d* contains a whole volume of science to be gained by the rvation of nature.

I bring fresh showers for the thirsting flowers,
  From the seas and the streams;
I bear light shade for the leaves when laid
  In their noon-day dreams.
From my wings are shaken the dews that waken
  The sweet buds every one,
When rocked to rest on their mother's breast,
  As she dances about the sun.
I wield the flail of the lashing hail,
  And whiten the green plains under,
And then again I dissolve it in rain,
  And laugh as I pass in thunder.

i there a city street, however poor and mean, where the clouds, helley saw them, could not form the basis of a term's work in tical nature study? The first stanza suggests the study of sture, its distribution and relation to plant life, the sea, the am, the bud, the flower, condensation, evaporation, hail, snow, i all their attendant phenomena, and all related through onification to the life of man. As I remember, nearly all objects referred to in Mrs Wilson's complete course in nature y were found within four squares of a great city.

s a student, and to test the practibility of nature work in the I volunteered to try to direct that part of the work in one ir Buffalo vacation schools last July; and this work, suppleed by that done in my own school under more favorable cones, forms the basis of the observations and comments here i. This experiment no doubt was made in an unscientific

workmen, became enthusiastic over this work, and seemed to grasp its practical value to them.

Another class naturally desired to study the things coming from the soil, the plants and flowers. They saw that the rain made them grow, the frost injured or killed them, the wind scattered their seeds and so helped them to live again, while the sun furnished the light and warmth to make them grow, blossom and bear fruit. Then came the questions as to why the plant blossomed, and the use of the seed in trying to reproduce its kind. They saw the efforts of plants to live, and asked the question why they were here, and of what use to us. This led to classification into good plants and bad plants, weeds and flowers, and the uses of each in nature.

The work on rain suggested that one class be sent to study the brook and the river and the life of each. This class constructed aquariums and studied this phase of life at close range, its needs in order to live, its habits, its food, and how these animals differed from the land animals. They found tadpoles, fishes and water beetles, and discussed their relations to vegetable and mineral life and incidentally the early life on the earth.

The study of the air brought up the subject of the inhabitants of the air, and a class was set to work on the birds, bees and insects, and their relations to the vegetable world, their classes and habits.

Thus the study of the weather and its influence on human life and on the animal, vegetable, and mineral kingdoms created the desire to investigate in the different classes, and furnished a common ground where all could meet and compare the interesting things each had observed. More experiments were given along each of these special lines, and the children seemed happy in doing the work. They were ready to observe, and to give practical expression to what they had seen in the drawing, manual training, and language classes. The stories in each class were along the lines of their nature study, and thus new interest was given to the work. The sacredness of life, coming from and cared for by the Creator, was the central thought in al

of the work, while close classification and scientific naming of species were a secondary matter.

What a field for common thought, mind and conscience awakening we found in this study, as we discussed our duties to animals, to plants, and to each other. Perhaps we only accomplished a small part of what we desired to do, and yet the working toward the great unity of our lives with all life, all nature, helped to solve for us the problem of the field lesson. The children needed no special preparation, the teacher none, as all went forth to solve a question in which they were interested; and many succeeded.

Was it of practical value to the children? you ask. To give these children, even from the lower walks of life, some idea of the history of the earth's formation, of the making of the soil, of the best soil for plants, of the uses of minerals and metals, of the relations of animal, vegetable, and mineral life, of the habits of insects, birds, and bees, of how nature adapts herself to varying environments and tries to become as perfect as possible, of her exact laws of life; and, over and above all this, to see the beauty, order, purity and truth in all her manifestations, is surely of practical worth. To give this glimpse of a fuller, higher life has a value not to be estimated, and those who receive it best will become the best citizens, the greatest poets, scholars, and philosophers, the best housewives, artisans and scientists.

In the limited time allowed us in the vacation school we could only plant the seeds, and trust the future to carry on the work begun. I trust the little done may prove as great a benefit to these children as I know it has proven to the children of my own school, where it has been possible to watch the results more thoroughly. Classes in six different grades have been sent out the past term for a general field lesson, during the time of an afternoon session; and, while I could give many illustrations of the far-reaching results of even a single field lesson, it will not be consistent, in the time at my disposal, to refer to more than one or two of these, as given to me in the reports of the teachers, themselves.

One class of second year pupils was sent out last October observe primarily, plants and the dissemination of seeds; s ondarily, the general preparations of nature for winter; and gather materials that would be of use in their winter lesso As a preparation they were told what to observe, and cautio against indiscriminate collecting, the summer work of the pl was reviewed, and each was asked to provide a box for the jects collected. On the trip they observed birds, domestic a mals, four classes of trees, many varieties of plants, and the w of water in land sculpture, besides making collections of see nuts, leaves, cocoons, egg masses, etc. In the report asked for this lesson, two months later, in answer to the question, in wl subjects the teacher had found the field lesson most helpful, answered: "In language, reading, drawing, and in fact all s jects of the school course." Asked for definite examples of benefits derived, and her opinion of field work in general, replied as follows: "In the field lesson the children derive clearer idea of the individuality of the plant, they studied nat in her own home. They took note of the different conditi under which the plants grew, and what kinds were most abu ant in the locality visited, and were led to question the why a wherefore of what they observed. Afterward, they seemed m interested in our nature talks; shy ones forgot their diffide in their eagerness to tell what they had seen 'out in the fi that day'. Many of them made other little trips to the wo and fields the weeks following, and the accounts of what tl had seen gave evidence of a markedly increased closeness of servation. There was noticeable, too, a quickened appreciat of the 'dignity of nature', less of 'I will bring it here', a more of the 'I will go and see' when there was a doubt on a question in plant study." Farther, she replied: "As to field l sons in general, I think there is a possibility of incalculable g to the child in the way of training his observant faculties a developing in him that fine perception of the beauties of nat so helpful in after life."

is another book that I want to recommend as a nature study book, or rather magazine, *Bird lore*.

———I would like to say a word in reply to Mr Eaton. It takes a good deal of courage to say that I am the friend of the English sparrows, and I won't go into the detail of that now. But it is a great mistake to teach the boys to shoot them. There is such a thing as the lust of killing, which seems to be implanted in the masculine mind, and, where there is a desire to shoot the English sparrow, there is a desire to shoot just one more. Mr Eaton says, himself, that he reserves the rarest things for the bright scholars. In the same way I think they are tempted to shoot just one more. I wish to enter a protest with regard to the shooting. My own observation has led me to think that the English sparrow is quite as much sinned against as sinning. I have observed him carefully for three or four years now, and I think there are some things to be said in his favor. My observation is not that the English sparrow is altogether crowding out other birds; he is very much crowded out all summer long, he has no resting place for the sole of his feet except the street. The other birds come and take his nest, eat his food and crowd him out, and altogether I think he is quite a persecuted bird in Rochester.

———I would like to give a practical illustration along this line. There is great danger in allowing the boys to shoot the sparrow. There is a line of trees near my residence, and thus I have birds in my vicinity. Part of the trees are in my back yard. In trying to protect the birds during the last season, I found that I was obliged to go back there and ask the boys what they were shooting. "Why, a sparrow", they would say, but I found they were more often aiming at some other bird. Do you see the point? The remark was made this morning that we need to know the kinds of birds. Possibly, when they do know them all, we can give them permission to shoot the sparrow. I find them shooting the best song birds we have. They do not distinguish the sparrow from any other bird.

———**Is it not a difficult matter to be always able to tell the English sparrow? There are so many birds so much like the English sparrow.**

inter. Mrs Spencer calls them her English boarders. I
ratched them a great deal and have wondered if they were
reputable as they are alleged to be. I have also been in-
ed in Prof. Cobb's paper in regard to his method of teach-
field excursions. That is a very important thing. Mrs
ock gave you a very clear account of the methods of the
r in Oakland; and, where nature study is taken in that
ou will find that it is a vast help.

GENERAL SESSION

MORAL VALUE OF SCIENCE STUDIES

PRIN. FRANK CARNEY, KEUKA INSTITUTE, KEUKA COLLEGE

cation is a sort of war which can never be avoided by
ation. The warfare has been waged from the beginning;
s precipitated without cause, it was born with man. No
r how elementary or how complex may have been our pro-
ers, every advance has had a cost. So insistent has been
ntest that man would decay without it; this very struggle
tion from age to age has induced mental currents that
ily storing the magazines of his achievements.

ntal discipline may be obtained from almost any study.

would keep children at home unless the schools can be reduced to a Chinese sameness are people who betimes occupy public attention on school matters. And now at least one member of this association would urge that our primary, intermediate and high schools give more time to science studies because of their moral value.

The purpose of education, besides what it does for the individual, is to "insinuate into hereditary influences noble aspirations"; to induce in the developing mind, at the greatest possible saving of time and effort, the epitomized development of the race; in other words, to aid the individual in finding the focus of social tradition. We are born with certain demerits of inheritance which our training must lessen, if the race moves upward. It would seem then that the particular training which can attain this end is the one most desired. There is no neutral ground in character activity. There must be growth positive or negative. The growth is always from within outward. The function of the teacher is to inspire the pupil, so to direct the growth-propelling flame within him that only the embers of right living may glow into the heat of life. Books and teachers are the forces; hence the great responsibility which educators have always felt.

The inculcation of morals was formerly the province of religious preceptors; now either morality or immorality, or both, is taught by every man, and even the dead are made the occasion of much moralizing. We are all magnets of everyday ethics. But these mind or soul magnets always have poles of unequal strength: they comply with the laws of the physical magnet. Whenever a fellow-man comes into your magnetic field, the needles swing. These moral magnets are charged in the process of education, when the positive pole should be made the stronger; otherwise, while the individual may not suffer greatly, the race can not rise. The teacher, then, is the prime character-former; for time and eternity his vocation has no peer. How best to handle the developing mind is always an open question with pedagogues. To certain dicta has been given quite universal sanction, but our professional methods are usually in

So many targets are used in order to "teach the
lea how to shoot." We agree that, as the child grows,
er of observation is first developed, then the ability to
abstractly and finally his mind stimulates itself, he

If there be a "royal road" to knowledge, it is ob-
n, along which one may "read as he runs." The earlier
f man's rise from primal simplicity must have been at-
ntirely through observation. The sciences which are
tional in the large were first developed; the study of
hy marks a complex stage of the race. In every age
eptive faculties have dominated the strongest men; they
it their fellows did not see. Other things being equal,
who sees most is always the wisest man; his seeing
ne-sided, his thinking is liberal, his truth is complete.
tion stimulates the imagination and begets reasoning.
then that develop the powers of observation make a
r moral growth.

e fear there is no consensus of opinion as to what con-
genuine morals. With the individual at least may it
a vitalizing sense of duty? The old saw, "honesty is
policy," has made many men appear moral; society has
ackets that necessitate the same shamming; to show
with the idea that they are merely lent is not self-sac-
is egotism. To obey civil laws through fear of the pen-
icted on lawbreakers, to observe hygienic requirements
e may avoid pain, to practise economy in order to feast
s on gold, are not the promptings of an actuating sense
; obeying laws because they are laws, protecting the
cause it is the abode of the mind, and living providently
ciety may never be burdened with our support, are ad-

the Greeks and some older peoples so strong a moral sentiment was not attached to the subject of veracity as is today, specially among the Teutonic races. Why the change? The political economist would say, because men have learned that it does not pay to lie, that business faith is ruined by falsehood, or that confidence in business is established as misrepresentation dwindles. In the evolution of society certain moral rules have become current, but experience or the effort to establish harmony between man and circumstances is the concrete origin of these rules. Slavishly conforming to practice or custom does not involve an exercise of the moral sentiment. Is moral feeling ever induced save by a conflict of emotions? And, when the same emotions have frequently come in contact, may not the moral feeling give place to habit? But every such habit represents a struggle which involved complex experiences of the race. On what then does the moral progress of the race depend? In ethical acts there is both a rational and an emotional element. We must grow in accuracy of moral judgments, and must increase the field to which we apply such judgments. The attainment of these ends can be hastened by our schools. Caution is a salient characteristic of strong individuals, and is nowhere better developed than in the laboratory or by applying the laboratory method to school work.

"As a man thinketh, so is he". Would you direct the moral growth of the youth, then control his thinking. How can this be better done than by arousing his interest in all that is about him, the flowers, animals, rocks, the heavens, all nature? Thought is sometimes a subliming process; again it is destruction, distillation, when the ash is the precious product. Greek and Latin classics afford much desirable and healthful inspiration, but now and then a bit that is not refining. If the student, owing to limited time in school—and 80% of our boys and girls, we are told, never get beyond the grades—must forego either the languages or the sciences, he will become a more active moral unit in society if trained at least in visible nature, which affords endless stimuli to which his mind, if properly attuned,

divinity; now we see majestic mind where before was awful fixedness. For 1500 years the church possessed three facts about astronomy: that on the fourth day the sun and moon were made; that at Joshua's command the sun and moon stood still; and that in answer to Hezekiah's prayer the sun backed up 15°.[1] Supernatural intervention has given place to the unvarying law of a wisdom beyond man's complete comprehension; witchcraft and its attendant evils have vanished. The reign of religious terror which accompanied a theology out of joint with scientific truths had a pernicious moral effect. The emotional instincts suffered at the contemplation of the barbarous persecution. Fear is never a factor of reform. The rack and wheel may destroy the body but not the mind. To perform duty for its own sake is a precept of science; duty complied with through fear does not involve moral activity.

Science study has evolved in the race a sympathy that results in good works; it has made true humanity practical. Biology causes man to stand in wondrous admiration before the manifestations of divine wisdom; all life, even the microscopic organism, commands awe and receives it. We have come to love the laboratory spirit, that is, to love truth for its own sake, to rejoice in the very search for it; every law thus educed is divine law; the act of finding it is the revelation; the human agent through whom this scientific spirit has worked is verily "inspired". In the certainty and fixedness of nature moral life has its real conception. Blind belief, drowsy acquiescence, and childish faith are the earmarks of puerile man. The two year old rests from all fear in his mother's arms; the calm stability of the universe and the quiet measureless forces of the earth life past and present should equally sooth men in moments of unrest. In becoming men we pass through three stages: "faith, doubt, rational belief or knowledge." Knowledge of his environment and sympathy with all his fellows enable[2] man to get the most out of life. Thus is illustrated broadly the uplifting or moral developing value of science studies at any stage of human progress.

[1]Calthrop, Rev. S. R. "The debt which religion owes to science."
[2]*J. G. Schurman*, in publication of the Liberal club, Buffalo. 1892. p.42.

inanimate, contributes its quota to the general welfare. I too much to expect that in the course of time science teacl may instil in future generations the fact that all property sh contribute to the support of the government which makes sible the ownership of property? Nature's socialism is discl by science study.

And we have a right to expect much more from this st A knowledge of natural laws should increase respect for laws. It seems paradoxical that under a form of governn where everybody has something to do with making the l there should be any disrespect for law. Men do not so m question the right of laws, but they quibble at compliance; t lack a vivid conception of duty. Again, the study of nature velops the esthetic sense in us; the poetry of nature and the presentation on canvas of scenery are evidences of this fact. pleasure we experience in painting, music and sculpture beyond analysis; such pleasure has been manifested largely peoples of higher intellectual intelligence, and possibly m keenly by those who have had training in the sciences. M itself affords the same discipline acquired in some laboratory search. Geography is a science; history is best taught by scientific method. The two combined and properly prese should give a sort of sociology, a science studied principally colleges and universities, but which is properly a subject of schools. No other combination of subjects is more profitable impressing on pupils the moral value of sympathy with the of natural selection. Enterprises flourish and cease, cities founded and vanish, nations rise and fall, and species bee extinct, not without cause. Normal body and normal mind two requisites for the real enjoyment of life. The law of se tion ultimately has its way to the extent that we are lackin these two particulars. There is still another end which we t a more general study of the sciences may attain. We n acknowledge that throughout the world, even in this repul a majority invest war with a sort of moral grandeur. In volunteer service there is a self-sacrifice which even in a

the universe are acting, God's will is expressed. In the apparent falling into disrepute of some theology, science alone can avert misfortune. For some time much so-called agnosticism has arrested attention. Theologic teaching as rearranged by science enables the religious in man to develop with his consciousness. In the present age faith without science can accomplish little; faith with science is power supreme.

Prof. Charles W. Dodge—I am sorry that, owing to the late hour, there will be no time for discussion of Prof. Carney's paper. It impresses me as one of the most thoughtful that has been read at this meeting. We shall have to go on to the next paper on the program.

It seems very fitting that we should close the literary part of our exercises by hearing what has been done for the junior naturalists, boys and girls. It is something of university extension, of the scientific laboratories of Cornell bringing the work done there into the comprehension of the young scientists of the state. I have no doubt that if the boys and girls of this state were to take a vote as to which is the more popular, Santa Claus or "Uncle John," it would be a tie with the chances in favor of "Uncle John."

I have great pleasure in introducing John W. Spencer, who is to tell us about the work of the junior naturalist clubs.

WORK OF THE JUNIOR NATURALIST CLUBS

BY JOHN W. SPENCER, CORNELL UNIVERSITY

When a naturalist reaches out with his scoop net in an aimless way, he will sometimes catch some queer specimens. This is just what the president of your association did when he went out hunting for some one to tell you about the "work of the junior naturalist clubs." He caught a red schoolhouse man—one who is a farmer by profession and practice and has that calling in every fiber of his body; who has enough science not to plant his crops or kill his hogs by the sign of the moon; who was raised in a family with no brothers or sisters and has no chil-

would have been bad, both in principle and policy. Nevertheless, we have been moderately successful in getting it there. I must confess it was accomplished by subterfuge—by false pretense. It was done by giving the rose another name, that of nature study. The fact that the average teacher in the rural school is deficient in subject-matter in affairs pertaining to rural life was well understood. To give some equipment in this respect a series of leaflets has been prepared for free distribution, calling the attention of the teachers to many common things about them.

The first issue was entitled, How the squash gets out of the seed. Other topics followed, such as, How the candle burns, Four apple twigs, A children's garden, Some tent makers, Hints on making collections of insects, Leaves and acorns of our common oaks, Life history of the toad, The birds and I, Life in an aquarium, How trees look in winter, Evergreens and how they shed their leaves, A summer shower, Little hermit brother, A handful of soil, and what it does, Stealing a ride, The red cow and the maple tree, A bulb garden, Cuttings and grafting, The burst of spring, The early birds, Opening of a cocoon, A brook and its work, Insect life of a brook, How plants live together, or Plant societies.

We have the names on our mailing list of not far from 25,000 teachers who are receiving our literature on these topics. It has been very pleasant to receive requests from so large a number, and the frequent complimentary words are joy to the soul, but such does not always mean business. How many of the numerous subjects were transmitted to the children, we could never tell, and we felt the need of establishing some relation by which we could feel the pulse of the school. Besides, to a small number of teachers there are conventionalities in instruction as imperative as those of society in making calls and leaving cards. Such teachers have no power to initiate and are never suspected of generating spontaneous combustion and are as incapable of enthusiasm as a graven image. Again, there are others who feel safest in giving instruction as they were taught. There are a

As soon as members have paid four dues and thereby have come entitled to the badge, a report should be made of the : All reports of the treasurer should be given to the secretary he may inclose them with the monthly dues that are sent to bureau of nature study.

Any member receiving the largest number of votes sha declared elected to the office for which he was nominated.

The declared object of the junior naturalist "is the stud nature, to the end that every member thereof shall love country better and be content to live therein." All boys and living in the state of New York, who bear recommenda from their teachers, are eligible to membership.

Any number of four or more may constitute a club.

Immediately after the election of officers, a report of the or zation, on a blank herewith inclosed, should be sent to Bureau of nature study, Cornell university, Ithaca N. Y.

As soon as possible after the receipt of such report, the bu will send a club charter. If the club wishes to christen i with a name, such will be inscribed in the charter.

The club dues. Most clubs have dues, and so have ours; the payment is required in work, not in money. Each me is expected to tell Uncle John at least once a month by l or by drawings what he has seen and thought on some in nature study suggested by the teacher or by the burea nature study. These dues can be paid during the English drawing periods.

The standard of excellence of dues is not based on scholar but on the member telling in his own way what he has seen thought. It is hoped that he will not imitate the parrot b peating what he has heard others say. Drawings relatin the nature study topic will be as acceptable as letters or positions. These monthly dues will be interesting subject both the English and drawing periods.

On the receipt of the fourth acceptable dues from any me in good standing, a badge pin will be sent, to be worn by hi a testimony that the owner is entitled to all the honors d young naturalist. Badges are never sent to hire boys and to join a club.

If members wish, they can send their written dues in the of a letter addressed to Uncle John. When the secretary these dues and the treasurer's reports, the postal address sh be "Bureau of Nature Study, Cornell University, Ithaca N The record of each member will be kept and the letters exan by a member of the bureau staff. Letters relating to per affairs or special inquiry should be addressed to "John W. S cer, Bureau of Nature Study, Cornell University, Ithaca N. Y

In the case of members of clubs found in the lower grades and a few even in the kindergarten, we direct attention mainly to observation; to seeing what they look at. When the child becomes more advanced and is able to understand what some of the things he sees stand for, we lead him on in a direction of cause and effect. On the older members we try to impress two principles as pertaining to all life, first, motive, i. e., self-preservation and reproduction of kind, and second, ingenious methods for accomplishing such ends. For instance, under the head of seed travelers, we make prominent the fact that the thistle cares so well for itself that all the warfare of the husbandman and competition with other plants will never exterminate it. The plant can not change its location, but it gives its seeds a splendid opportunity to travel to places where strife and competition are at the minimum and the soil congenial. Just now we are giving the junior naturalist clubs the subject of starch factories and source of raw material and motive power. When they come to you, I think you will find them with a keen desire to know the physiology of the leaf and plant, because of their investigations with iodin and observation of the leaning of the foliage toward the light.

We try to save the teacher all possible trouble. We prefer that no stated time be given to the consideration of our topics. Beginning with early spring, an aquarium in the schoolroom — and often it is a rude one—will rival a game of marbles. Its care can be made a post of honor to the child, and the school will find more questions than a Solomon can answer. The payment of club dues correlates with language and drawing.

Prof. Charles W. Dodge—In giving his bit of personal history, Mr Spencer was too modest to state the fact that he has more nephews and nieces than anyone else except Uncle Sam. I think you will agree with me in deciding that, if there has been any teacher present at this meeting, we have just listened to him. I have never heard any one who has the natural gifts of the teacher to a greater extent than "Uncle John." It is very wonderful how he has succeeded in interesting the class of

MEMBERS 1901

When the name of an institution includes the name of its town or city, the latter is not given. Where no state abbreviation appears, New York is to be understood.

Allen, Charles M., Pratt institute, Brooklyn
Allen, John G., Rochester high school
Anderson, W. W., Westminster school, Dobbs Ferry
Andrews, Kate R., University of Chicago, Ill.
Arey, Albert L., Brooklyn
Armstrong, Charles H., Workingman's school, New York
Arnold, J. L., DeWitt Clinton high school, New York
Atkinson, George F., Cornell university, Ithaca

Babcock, Edward S., Alfred university
Barber, H. G., DeWitt Clinton high school, New York
Bardwell, D. L., sup't of schools, Binghamton
[1]Barrows, Franklin W., Buffalo central high school
[1]Beach, Channing E., public school no. 23, Buffalo
Beach, Grace B., normal college, New York
Beadel, Charles W., normal school, Indiana Pa.
[1]Bean, Charles M., Pulaski high school
Belknap, Emmet, sup't of schools, Lockport
[1]Bennett, William M., Rochester high school
Benoliel, Sol D., Adelphi college, Brooklyn
Bevier, Marie L., Peter Cooper high school, New York
Bickmore, Mary E., Mount Vernon high school, New York
Bigelow, Maurice A., Teachers college, New York
[1]Bishop, Irving P., Buffalo normal school
[1]Blackall, Gertrude C., 342 University av., Rochester
Blossom, Margaret, Packer collegiate institute, Brooklyn
Bogert, Marston T., Columbia university, New York
Bond, W. E., Potsdam normal school
[1]Boniface, Sister M., Nazareth academy, Rochester
Booth, W. M., Cortland normal school
Bowers, Emma, 100 Hector st., Ithaca
Brace, Edith M., 131 Park av., Rochester
Bradley, Theodore J., Albany academy
[1]Brigham, A. P., Colgate university, Hamilton
Bristol, Charles L., New York university
Britcher, Horace, medical college, Syracuse
[1]Brownell, W. A., Syracuse high school
[1]Brownlee, R. B., Titusville (Pa.) high school
Burgin, Bryan O., Lowville academy
[1]Burlingham, Gertrude S., Binghamton high school

Call, Richard Ellsworth, Erasmus Hall high school, Brooklyn
[1]Callahan, E. B., Richfield Springs high school

[1]*Attend the Rochester* meeting.

Carey, E. L., St John's college, Brooklyn
Carney, Frank, Keuka institute, Keuka College
Carpenter, Idalette, Maplewood (N. J.) high school
Carss, Elizabeth, Teachers college, New York
Case, L. V., Washington Irving high school, Tarrytown
[1]Cate, Eleazor, 16 Ashburton place, Boston Mass.
Cattell, J. McKeon, Garrison on Hudson
Chambers, V. J., Geneva high school
[1]Chesebrough, Thomas U., Littlefalls high school
Chollar, Sarah V., Potsdam normal school
[1]Christian, Elizabeth, Glens Falls high school
Clapp, B. G., Fulton high school
Clark, John Anson, Ithaca high school
Clark, O. D., Brooklyn boys high school
Clark, Tracy E., Brooklyn boys high school
Clarke, John M., New York state museum, Albany
[1]Clement, Arthur G., Regents office, Albany
[1]Cobb, Charles N., Regents office, Albany
[1]Colby, E. C., Rochester atheneum and mechanics institute
[1]Comstock, J. H., Cornell university, Ithaca
[1]Cooley, LeRoy C., Vassar college, Poughkeepsie
Cornish, R. H., Wadleigh high school, New York
[1]Crawford, A. Myrtella, Buffalo central high school
[1]Crissey, Jay, sup't of schools, Penn Yan
Curry, C. M., Cortland normal school
Curry, Mrs Sarah E., 70 N. Main st., Cortland
Curtis, Arthur M., Oneonta normal school

Dann, Mary E., girls high school, Brooklyn
Davenport, Charles B., University of Chicago, Ill.
Dean, Philip R., DeWitt Clinton high school, New York
[1]Denham, Henry H., Buffalo central high school
DeShow, Charles H., grammar school no. 58, Buffalo
[1]Dodge, Charles Wright, University of Rochester
Dodge, Richard E., Teachers college, New York
Doll, Carrie L., grammar school no. 37, Buffalo
Doremus, C. A., College of the city of New York
[1]Duvall, C. A., Syracuse

Elliott, Arthur H., Flushing
Emerson, Josephine, Pratt institute, Brooklyn
Erickson, Dan E., Chicago Ill.
Evans, Susan, 205 Court st., Rome

[1]Farnham, Amos W., Oswego normal school
[1]Fish, Pierre A., Cornell university, Ithaca
Fleming, Mary A., 432 Pearl st., Buffalo
Fox, Ada H., Masten Park high school, Buffalo
Freley, J. W., Wells college, Aurora

[1]Attended the Rochester *meeting*.

Fuller, R. W., DeWitt Clinton high school, New York
Furman, Bertha M., Miss Veltin's school, New York

[1]**Gage,** O. A., Geneva high school
Gage, Simon Henry, Cornell university, Ithaca
Gaines, E. V., Adelphi college, Brooklyn
Gano, Seth T., Edmeston
[1]Gardner, George S., 141 Clifton st., Rochester
[1]Gemmel, Marion, Masten Park high school, Buffalo
Gibson, J. J., Wadleigh high school, New York
[1]Gifford, T. I., Pike seminary
Gillmore, Gertrude, Froebel academy, Brooklyn
Glavin, John F., St John's academy of Rensselaer
Goodrich, A. L., Utica free academy
Gorton, J. Irving, sup't of schools, Sing Sing
Graham, W. P., Syracuse university
[1]Greene, W. J., Hoosick Falls high school
[1]Greenwood, John W., Masten Park high school, Buffalo
Griffis, Henry L., New Paltz normal school

Haanel, Eugene, Syracuse university
Hale, Albert C., Brooklyn boys high school
[1]Hall, James H., Cazenovia seminary
Hallock, William, Columbia university, New York
Hancock, W. J., Erasmus Hall high school, Brooklyn
Hanna, Jennie P., Rochester high school
Hargitt, Charles W., Syracuse university
[1]Harris, C. Everett, Rochester high school
Hastings, George T., Cornell university, Ithaca
Hering, D. W., New York university
[1]Herrick, Lillian B., Elmira free academy
Hixon, Kate Burnett, Peter Cooper high school, New York
Hodges, G. C., Utica high school
Hopping, Roy, 129 4th av., New York
Hoxie, Jane L., Ethical culture schools, New York
Hubbard, Dwight L., 117 W. 93d st., New York
Hudson, George H., Plattsburg normal school
Humphrey, O. D., Jamaica (L. I.) state normal school
Hunt, Arthur E., Manual training high school, Brooklyn
Hurd, Frances, Oneonta normal school

[1]Jameson, J. M., Pratt institute, Brooklyn
Jaquish, Benjamin M., Dr Sach's school, New York
Jewett, Franklin N., Fredonia normal school

[1]Karr, Grant, Oswego normal school
Kauffman, W. L., Yonkers high school
[1]Kelly, Henry A., Ethical culture schools, New York

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[1]*Attended the* Rochester meeting.

Kelly, Mrs H. A., Ethical culture schools, New York
Kemp, James Furman, Columbia university, New York
[1]Kenyon, O. C., Syracuse high school
Kingsbury, George H., Newtown high school, Elmhurst
Kingsley, J. Stanton, Newark Valley high school
[1]Kittredge, R. J., Schenectady union classical institute
Knapp, Allen H., Canton high school

Langworthy, William F., Colgate academy, Hamilton
[1]Leary, Montgomery E., Rochester atheneum and mechanics institute
[1]Lee, Frederic S., Columbia university, New York
[1]Lennon, Alice L., Brockport normal school
[1]Lennon, W. H., Brockport normal school
Lewis, Fred Z., Brooklyn boys high school
Lewis, Mrs Lucy S., girls high school, Brooklyn
[1]Linville, Henry R., DeWitt Clinton high school, New York
Lloyd, Francis E., Teachers college, New York
Loeb, Morris, New York university
[1]Logan, Mrs Mary C., Lyons high school
[1]Lovell, Thomas B., Cleveland av. high school, Niagara Falls
Lyon, Catherine E., 113 Greene place, Brooklyn
[1]Lyon, Howard, Oneonta normal school

MacClaughry, Mollie, Saratoga Springs
McGreevy, Thomas H., High street school no. 39, Buffalo
McKay, John S., Packer collegiate institute, Brooklyn
[1]McMurry, Frank M., Teachers college, New York
Mann, Warren, Potsdam normal school
Mar, Frederick W., Brooklyn boys high school
[1]Marcella, Sister M., Nazareth academy, Rochester
Matteson, Florence M., Oneonta normal school
Maury, Mytton, 109 Cascadilla st., Ithaca
Mead, F. L., Madison school, Syracuse
Mercer, W. F., Chamberlain institute, Randolph
[1]Merrell, William D., University of Rochester
Merrill, F. J. H., New York state museum, Albany
[1]Miller, Gertrude, Penn Yan academy
[1]Milliman, Lennette G., Rochester high school
Moler, G. S., Cornell university, Ithaca
Moore, Katherine Rowe, Dresden
[1]Morrey, William T., Peter Cooper high school, New York
Morrill, A. D., Hamilton college, Clinton
Morse, C. W., DeWitt Clinton high school, New York
Morse, H. L. F., Troy high school
[1]Moulthrop, S. P., Washington grammar school, Rochester
Murphy, Charles T., Latin school, Brooklyn

[1]Nichols, Edward L., Cornell university, Ithaca
[1]Norris, Isadora, Springville high school

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[1]*Attended the Rochester meeting.*

Osborn, Henry F., Columbia university, New York

Paddock, Bertha L., Franklin academy, Malone
[1]Palmer, Lelia B., Utica free academy
Pattee, Ernest N., Syracuse university
Peabody, James E., Peter Cooper high school, New York
Peck, Henry A., Syracuse university
[1]Peckham, W. C., Adelphi college, Brooklyn
Piez, Richard K., Oswego normal school
Pingrey, Mrs Cora E., Whiteplains high school
Piper, P. F., Buffalo central high school
Pollock, Horatio M., Albany high school
Proper, Emberson E., Brooklyn boys high school

Raneson, Edward B., Friends seminary, New York
Reed, Raymond C., New York state veterinary college, Ithaca
[1]Reynolds, Roberta, Masten Park high school, Buffalo
Rich, J. F., Batavia
Richards, Charles R., Teachers college, New York
Richards, C. W., Oswego high school
Robinson, Emma C., public school no. 4, Mount Vernon
[1]Rogers, Charles G., Syracuse university
Rogers, F. J., Cornell university, Ithaca
Rogers, Mary F., Cornell university, Ithaca
Rollins, Frank, DeWitt Clinton high school, New York
Rowlee, W. W., Cornell university, Ithaca

Sage, L. Belle, Olean high school
St John, Thomas M., Browning school, New York
Sampson, Ezra W., Mott av. and 144th st., New York
Sanial, Marie L., public school no. 90, New York
Schmitz, H. J., Geneseo normal school
[1]Schneider, P. F., Syracuse high school
Schlissler, Amy, Teachers college, New York
Scott, Charles B., Oswego normal school
Scribner, E. E., Dunkirk high school
Seymour, A. T., Peter Cooper high school, New York
Sharp, Clayton H., Cornell university, Ithaca
Shatz, Josephine, Rochester high school
[1]Shearer, John S., Cornell university, Ithaca
Sheldon, C. S., Oswego normal school
[1]Sherwood, Leora E., Syracuse high school
Sieberg, W. H. J., public school no. 43, New York
Sleeper, Joseph J., P. O. box 14, New York
[1]Smith, V. J., Gloversville
Spice, Robert, Cooper union, New York
Stepanek, Beatrice, Canton high school
Stocker, John H., Brooklyn boys high school

[1]*Attended the Rochester* meeting.

[1]Stoller, James H., Union college, Schenectady
Stone, Anna J., school no. 13, Binghamton
Stowell, T. B., Potsdam normal school
Sweetland, Libbie, Dryden high school

Tappan, Frances, Oneonta normal school
[1]Tarr, Ralph S., Cornell university, Ithaca
Taylor, Joseph S., Sedgewick park, Fordham hights
Taylor, R. A., Fifth street high school, Niagara Falls
Taylor, S. N., Syracuse university
[1]Tenney, Lloyd S., Brockport normal school
[1]Thomas, M. Smith, Pike seminary
[1]Thurston, R. H., Cornell university, Ithaca
Trant, Amelia Earle, Masten Park high school, Buffalo
[1]Turner, George M., Masten Park high school, Buffalo

Underwood, L. M., Columbia university, New York

Van Arsdale, May B., Teachers college, New York
Vogt, Frederick A., Buffalo central high school
Von Nardroff, C. R., Erasmus Hall high school, Brooklyn
Vosburgh, Charles H., Jamaica L. I.
Vulté, H. T., Columbia university, New York

Ward, Charles H., Ward's natural science establishment, Rochester
Ward, Delancey W., 215 W. 42d st., New York
[1]Warner, A. R., Auburn high school
[1]Webb, Harry E., Pratt institute, Brooklyn
Weed, Henry T., Manual training high school, Brooklyn
Wetmore, Edward W., New York state normal college, Albany
Wetmore, Katherine S., Rochester high school
[1]Wheelock, Charles F., Regents office, Albany
White, T. G., Columbia university, New York
Whitney, E. R., Binghamton high school
[1]Wilber, T. C., Waterloo high school
[1]Wilcox, C. C., Starkey seminary, Eddytown
Wilder, Burt G., Cornell university, Ithaca
Willard, A. Blanche, Waterville high school
Williston, Arthur L., Pratt institute, Brooklyn
Wilson, John D., Putnam school, Syracuse
Wilson, Victor T., Cornell university, Ithaca
[1]Wixom, F. C., Penn Yan academy
[1]Wolcott, H. G., Clifton Springs union and classical school
Woodhull, John F., Teachers college, New York
Woodland, J. E., Cook academy, Montour Falls
Wyckoff, Adelaide E., Packer collegiate institute, Brooklyn

[1]Attended the Rochester *meeting*.

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gh School Department

Bulletin 14 August 1901

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id increase in public high schools throughout the United States
ted as a most conspicuous fact in education at the close of the
ıry. Within the jurisdiction of the University of the State of
: this increase has been specially noteworthy. In 1900 there
public high schools as compared with 231 in 1890, a growth in
of more than 140%. Though as elsewhere the old academy
becomes the public high school, yet there were 140 academies
compared with only 104 in 1890, an actual growth in 10 years
ıan 34%, due largely to the incorporation of parochial schools.
te of New York during the past decade, while the growth in
in the common schools has been only 16%, the number of
ol students and the total net property of secondary schools
: than doubled. At least 25% of all high school students now
balanced four year courses and rapidly increasing numbers re-
condary schools for graduate work.

he record in New York where academies were placed under
s of the University in 1784 and high schools by the original
school act of 1853. But even this growth is not more remark-
the correspondingly rapid increase under the supervision of
s of the University in higher, including professional and techni-
ion. In such institutions as in the public high schools the
nd the total net property have doubled during the past decade.
h in public high schools is not surprising in view of the popu-
ese democratic institutions and of the fact that advancing re-
s for professional and other degrees, now more uniformly high
ork than in any other political division of the United States,
nts into the high schools to gain the preliminary education
for admission to college. 10 years ago many institutions of
ıcation in New York received students without any preliminary
worth mentioning which today demand four years or even
tisfactory high school work or an equivalent. It is remarkable
such conditions the growth in higher education has been so
we except medicine where the normal growth has been checked
r by high standards, and some of the smaller colleges which as
itutions like the old academies suffer in competition with the
schools, the growth is very great throughout the entire field
ducation.

JAMES RUSSELL PARSONS JR
Director High School Department

High School Department

167TH EXAMINATION

SPELLING

Friday, January 25, 1901—1.15 to 2.15 p. m., only

---

e following numbered words are to be written by each candidate. ·xaminer should distinctly and properly pronounce each word (with umber prefixed), allowing sufficient time for writing it before the word is pronounced. Papers entitled to 75 or more credits will be ›ted.

was not to be (1) expected for a (2) moment that the (3) aordinary (4) crisis in China should have been (5) tided : (6) without a (7) protracted (8) period of (9) discussion, r the (10) rescue of the (11) foreigners at (12) Peking had ı (13) accomplished. The (14) program of the United es has been (15) clear from the (16) beginning. (17) Until foreigners were rescued, we could not (18) treat with the Chinese (20) government; but after (21) their rescue,—no e of war (22) existing (23) between the (24) people and ernment of the United States and those of China,—it (25) ained to plan for the (26) withdrawal of our (27) troops as ı as (28) prudence and (29) common (30) sense (31) might justify such a step, and then to (33) negotiate with the imperial government of China for a (35) reasonable (36) ːmnity and for (37) guarantees of (38) future good (39) be- ior. Our government was (40) ready (41) enough, (42) :efore, when a (43) month ago (44) Russia (45) proposed the ıdrawal of troops from Peking, to (46) express (47) approval hat plan, (48) provided it could be (49) generally (50) agreed (51) Germany was not ready, (52) however, to withdraw, (53) England (54) seemed to be (55) deeply (56) suspicious Russia's good (57) faith in (58) making the (59) suggestion. German government (60) insisted, as a (61) preliminary condition, that (63) those persons (64) high in (65) authority were (66) guilty of the (67) assassination of Von Ketteler, German (68) minister, and of other (69) outrages (70) nst foreigners, (71) should be (72) delivered over by the ıese to the (73) allied (74) forces for condign (75) punish- t. Even if this were (76) otherwise reasonable or (77) pos- :, a moment's (78) thought will show that this (79) demand implies that the guilty (81) persons are well (82) known, can be (83) surrendered for punishment without any (84) :ial (85) investigation as to their (86) innocence or guilt . . . (87) severe (88) retribution (89) policy now proposed by ıany could (90) only (91) lead in the end to far more (92) ːdable (93) movements in (94) hostility to (95) Europe. thing that is (96) necessary is to (97) encourage and to equire the firm (99) establishment in authority of a (100) l Chinese imperial government.

High School Department

167TH EXAMINATION

SPELLING

Friday, January 25, 1901—4.15 to 5.15 p. m., o

The following numbered words are to be written by each c The examiner should distinctly and properly pronounce each w its number prefixed), allowing sufficient time for writing it c next word is pronounced. Papers entitled to 75 or more credi accepted.

(1) Foreign (2) affairs and (3) military (4) question certainly (6) threaten to (7) overshadow the (8) dem home (9) legislation in (10) England for some (11) cons time to come. This is a fact to be (12) sincerely (13) d But the (14) balance will (15) right (16) itself in time, internal (18) reform must have its innings. Then wil time for (19) enacting (20) pensions. I have (21) cons this (22) point a (23) variety of (24) public men, (25) ists, (26) members of (27) parliament, and (28) labor (29) They one and all (30) indorse the (31) conclusion whic formed as an (32) independent (33) student of public (ion: that, (35) apart from foreign (36) policy, and the policy it (37) involves, there are two questions which (pass all other questions in their hold on (39) popular tention; and these two questions are—first, pensions, a second, (42) housing. At (43) present, so far as we can may (44) accept it as a certainty that pensions stand f among all the (46) innumerable claimants for home leg To have got the question into this unrivalled (47) pro is to have (48) registered no small advance. Our own for (49) universal pensions has made (50) remarkable (way (52) during the most (53) exciting (54) period of t Other and (55) rival (56) projects have (57) retired or b abandoned. With the (59) doubtful (60) exception of crude and (62) impracticable (63) proposals of the (64 (65) committee, there is no other (66) scheme than ou (67) possession of the (68) field. We have been (69) ing and (70) consolidating our (71) forces, we have b advancing our lines as it were under cover of the (7 ness; and when the day (74) returns, our (75) position (76) strength will be an (77) unexpected (78) revelatio many . . . By the (80) explicit (81) avowals of lea both sides of the house our question has been (82) cl (83) non-partizan. The (84) cynic might say that t change of (86) category means only that both (87) part (88) agreed to (89) shelve a (90) difficult (91) problem. is (92) indeed a (93) danger of non-partizan (94) meas ing (95) overlooked (96) amid the (97) crowd of (98) h contested (100) claims.—*F. H. Stead*

High School Department

168TH EXAMINATION

SPELLING

Friday, March 29, 1901 — 1.15 to 2.15 p. m., only

he following numbered words are to be written by each candidate. examiner should distinctly and properly pronounce each word (with number prefixed), allowing sufficient time for writing it before the t word is pronounced. Papers entitled to 75 or more credits will be epted.

it is (1) popularly said of late that the Indian can not "for several generations" (3) compete in the (4) intellectual (5) orld, but that he is (6) destined for an (7) indefinite (8) period remain a (9) keeper of (10) flocks and (11) herds, a (12) tiller the soil, or at the best a (13) humble (14) artisan . . .

Let us (15) examine into the (16) logic and (17) justice of is (18) idea. Since (19) culture or any (20) acquired (21) ait, (22) according to the (23) highest (24) scientific (25) au-orities and the (26) widest (27) practical (28) observation, is ot (29) transmissible from (30) father to son, it (31) matters ot in (32) reality (33) whether the red man has "several gen-rations" of (34) educated progenitors (35) behind him. Many f our (36) foremost (37) Americans were born of (38) illiter-te (39) parents; some of the (40) greatest of them all, as we ke a (41) certain pride in (42) recalling, were practically self-ducated, and lived in (43) early (44) youth under (45) condi-ions of (46) almost as (47) primitive (48) simplicity as those at once (49) surrounded the (50) children of the (51) forest. ore than this, it is (52) commonly (53) reasoned that these ery conditions (54) favor the (55) development of (56) original ifts and the (57) stern (58) virtues of (59) character; and we re told that the scions of (60) wealthy and cultured (61) fam-lies tend (62) constantly to (63) degenerate, while out of (64) overty and rude surroundings spring the (65) hardy (66) ants of the race.

As a matter of fact, (67) probably the (68) ablest and most 9) cultivated men and (70) women of (71) native stock have een direct from the (72) wigwam to the (73) pulpit and ros-um, and (74) entered (75) without (76) delay into the common 7) inheritance of (78) mankind . . .

The (79) representative Indian is a man of (80) brains and) ambition. He has no (82) notion (83) whatever of (84) re-ining "for several generations" in the ranks of the (85) ers, and the (86) vocation of such a man (87) should be (88) rmined (89) solely by (90) individual (91) fitness and (92) ce. It is (93) fairly certain that his race will never be a of (94) servants. (95) Their gifts and their (96) traditions (97) people lie in (98) quite (99) another (100) direction.

—*Elaine G. Eastman*

High School Department

168TH EXAMINATION

SPELLING

Wednesday, March 27, 1901—4.15 to 5.15 p. m., only

The following numbered words are to be written by each candid[ate]. The examiner should distinctly and properly pronounce each word (wi[th] its number prefixed), allowing sufficient time for writing it before th[e] next word is pronounced. Papers entitled to 75 or more credits will [be] accepted.

(1) Abounding (2) prosperity among the (3) American (4) people is (5) almost as (6) serious an (7) embarrassment to th[e] finances of the (8) government as a (9) period of (10) busine[ss] (11) depression. The (12) treasury is (13) threatened with a[s] much (14) trouble (15) during the (16) coming (17) summe[r] and (18) autumn in (19) getting rid of (20) surplus (21) revenu[e] as it was a few years ago in (22) finding the (23) means fo[r] (24) meeting a (25) deficit. The (26) mere (27) piling up o[f] surplus (28) money from the (29) proceeds of (30) taxatio[n] (31) would in (32) itself (33) excite (34) criticism, but (35) con[-] ditions are made (36) worse by the (37) effect upon the mone[y] (38) market. The money (39) received for taxes goes into th[e] treasury, and if it is not paid out again for the current (40) ex[-] penses of the government, it is (41) withdrawn from the us[e] of the business (42) community. It is this fact which (43) brings the (44) operations of the treasury into such close (4[5]) relations with the business world, and (46) makes (47) lar[ge] surplus a serious threat to (48) merchants and (49) bankers [as] well as a (50) subject of (51) direct interest to the taxpaye[r]. The (52) present condition of the treasury grows in some (5[3]) degree out of the (54) preparations made for the (55) Spani[sh] war. These preparations (56) proved, by the (57) early (5[8]) termination of the war, to be (59) somewhat more than (6[0]) sufficient, but the money thus (61) collected has been (62) co[n-] stantly (63) increased of late by the (64) receipts from oth[er] (65) sources, (66) which are due in large (67) measure to t[he] (68) activity of business . . .

How (69) Secretary Gage kept the (70) balance under (7[1]) control and (72) averted a (73) panic at (74) several (75) criti[cal] (76) stages during the autumn forms an (77) interesting (7[8]) chapter of (79) financial (80) history, which has (81) heretofo[re] been (82) presented only in (83) fragments. There have be[en] periods in the business history of the (84) country when t[he] withdrawal of large sums from the money market (85) produc[ed] no (86) injurious effect. Several (87) causes (88) combin[ed] (89) however, during last year to make this (90) influence (9[1]) extremely (92) dangerous, not only to (93) speculation on t[he] (94) stock (95) exchanges, but to the general business of t[he] country. These causes may be (96) described (97) gener[ally] as the large (98) demand for (99) capital and the demand [for] (100) currency.—*C. A. Conant*

High School Department

169TH EXAMINATION

SPELLING

Friday, June 21, 1901—1.15 to 2.15 p. m., only

The following numbered words are to be written by each candidate. The examiner should distinctly and properly pronounce each word (with its number prefixed), allowing sufficient time for writing it before the next word is pronounced. Papers entitled to 75 or more credits will be accepted.

The (1) constitution of the new (2) commonwealth of (3) Australia (4) naturally (5) claims (6) attention and (7) challenges (8) criticism as the (9) latest (10) development in (11) federal constitution-making (12) among (13) people of Anglo-Saxon race. Its (14) authors had before them the (15) experience of this (16) country and of (17) Canada; and they have (18) evidently used that experience (19) freely, both in what they have (20) imitated and in what they have (21) rejected . . .

The federal (22) government of Australia will have (23) large (24) powers. In its hands will be (25) vested (26) exclusive (27) control of customs (28) taxation, (29) together with power to (30) impose all such other taxes as may be (31) required for the (32) public (33) service, with the sole (34) limitation that they shall be so imposed as in no case to (35) discriminate (36) between states, or parts of states; the sole control of all (37) matters of (38) defense; the (39) management and control of the (40) postal, (41) telegraph, and (42) telephone services of the country; (43) questions of (44) immigration, (45) naturalization, and (46) interstate trade and (47) commerce; the (48) maintenance of lighthouses, (49) beacons, and (50) buoys; all (51) external (52) affairs, (53) including the (54) influx and (55) extradition of (56) criminals, and all questions of (57) conciliation and (58) arbitration (59) extending beyond the limits of any (60) single state. Banking and (61) insurance, (62) coinage and (63) currency, (64) weights and (65) measures, laws (66) relating to bills of (67) exchange and (68) promissory notes, (69) bankruptcy, (70) patents, (71) copyrights, and (72) companies, are also vested (73) solely in the commonwealth. In (74) addition to these questions, (75) which are, for the most part, (76) familiar to (77) Americans as (78) subjects of federal (79) legislation, there will vest in the federal (80) parliament the sole right to deal with the law of (81) marriage, (82) divorce, and (83) matrimonial (84) causes, and all questions relating to (85) parental rights and the (86) custody and (87) guardianship of (88) infants, and also all public (89) provisions for old age and (90) invalid (91) pensions. To the commonwealth is (92) reserved the right to make use of all the (93) railroads (94 belonging to any state for defense (95) purposes, and also th power to control and (96) regulate the (97) navigation of rive (98) flowing (99) through more than one state.—These are th (100) principal powers reserved to the commonwealth.—*Lusk*

High School Department

169TH EXAMINATION

SPELLING

Wednesday, June 19, 1901 — 4.15 to 5.15 p. m., only

The following numbered words are to be written by each candidate. The examiner should distinctly and properly pronounce each word (with its number prefixed), allowing sufficient time for writing it before the next word is pronounced. Papers entitled to 75 or more credits will be accepted.

There is (1) reason for (2) believing that few persons who are not (3) directly (4) connected with the (5) operating (6) department of a (7) railway (8) understand or (9) appreciate the (10) difficulties (11) which (12) beset the path of the (13) conscientious operating (14) officer. He is (15) surrounded and (16) hampered by (17) many of the worst (18) attributes of (19) human (20) nature: (21) jealousy, (22) drunkenness, (23) revenge, (24) indifference, (25) deceit, (26) dishonesty, (27) laziness and (28) ignorance. He must be, on his part, just, (29) merciful, (30) severe, (31) cautious, (32) daring, (33) reticent, (34) candid, (35) temperate, honest and (36) thoroughly well-informed. In (37) employing men he must be able to form an (38) immediate (39) judgment as to the (40) quality of an (41) applicant, and in (42) dismissing a (43) servant he must (44) slowly (45) convince (46) himself that the act is (47) unavoidable . .

There must be no (48) question of (49) personal like or (50) dislike (51) between an officer and his (52) subordinates, no question of (53) religion or (54) politics or (55) nationality, and a man once employed must stand or fall on his own (56) merits, his (57) fitness or unfitness. The (58) only (59) consideration of (60) weight is the good of the (61) service.

This operating officer has not only the (62) defects of (63) some (64) hundreds or (65) thousands of other men to (66) combat and (67) eliminate, but he has the (68) limitations of his own nature to (69) fight. It is not (70) remarkable that he has (71) been (72) known to make (73) mistakes; it is remarkable that on the (74) whole he makes so few.

It is not (75) forgotten, in (76) reciting this (77) schedule of difficulties that the (78) innate (79) virtues of a (80) large (81) proportion of the men may be (82) counted on, and (83) either (84) ambition or fear of (85) discharge acts as a (86) restrainer with most of the (87) others. But when (88) every (89) advantage is considered, (90) there still (91) remains a (92) disheartening (93) residue of (94) immorality and (95) inefficiency which must be (96) overcome and (97) supplemented by the (98) mental (99) force and (100) ingenuity of the operating officers.— *G. H. Paine*

ing at the Pomme d'Or, the principal inn of a small Flemish village.

rite sentences containing the plural forms of the follow-uns: *canto*, *crisis*, *ox*, *wolf*, *cry*.

rite a letter to a friend, describing a day's work in school.

ve the part of speech and the syntax of *each* of the itali-vords in the following sentence:

astern tribes have *long* since disappeared; the *forests that* shel-em have been laid low, and scarce any traces remain of them in the settled *states* of New England.

rite sentences containing the following: *a*) a noun that singular form, *b*) a noun that has the same form for umbers, *c*) a noun plural in form but generally treated ;ular, *d*) a collective noun, *e*) an abstract noun.

lect from the following the incorrect sentences and re-in correct form, giving the reason for each correction: ther Mary nor Kate are going away, *b*) Each one of the to receive a book, *c*) I know better than her, *d*) Clayton dridge's factory was burned last night, *e*) We sell men y's clothing, *f*) He promised to take you and I to the t, *g*) I did not know whom to expect.

rite sentences illustrating the use of *but* as *a*) a conjunc-) a preposition; *that* as *a*) an adjective, *b*) an adjective n (demonstrative pronoun).

rite the third person singular of *each* of the tenses of gressive indicative active of *choose*, giving the names of ses. Write *four* infinitives of *choose*, giving the name

10 Write *a*) a complex sentence containing two subordinate clauses, *b*) a simple interrogative sentence containing a participial phrase.

11 Parse the italicized words in the following: *a*) The *children's* shoes were bought in New York, *b*) Mr Brown, the bank *cashier*, is very ill, *c*, *d*) *John*, will you do *me* a favor?

12 Explain the meaning of *five* of the italicized words in the following:

a This is the forest *primeval*. The *murmuring* pines and the hemlocks, . . .
Stand like *Druids* of eld.

b Where is the *thatch-roofed* village, the home of Acadian farmers?

c Benedict Bellefontaine, the wealthiest farmer of Grand-Pré,
Dwelt on his *goodly* acres.

d *Hearty* and hale was he.

e Sweet was her breath as the breath of *kine* that feed in the meadows.

f Thus to the Gaspereau's mouth moved on that *mournful* procession.

13 Describe the departure of the exiles from Acadie.

14–15 Write an essay of at least 100 words on *one* of the following topics, paying special attention to spelling, capitalization, punctuation, grammatic construction, proper use of words and sentence structure [Essays on subjects other than those assigned will not be accepted]:

a) Father Felician [Show how this holy man warned, comforted and helped his people], *b*) The passing of Gabriel [Give an account of the circumstances under which Gabriel passed Evangeline while she slept].

NOTE—Pupils not familiar with *Evangeline* may write on *one* of the following: *a*) The events of Christmas day, *b*) A feathered friend.

High School Department

168TH EXAMINATION

ELEMENTARY ENGLISH

Friday, March 29, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 14–15 and eight of the others but **no more.** *If more in eight of the others are answered only the first eight answers will considered. Each complete answer will receive 10 credits. Papers itled to 75 or more credits will be accepted.*

Analyze by diagram or otherwise the following sentence:
large *flock* of *sheep* which grazed in the pasture where the grass was ', now entered the *field* with the speed of frightened creatures.

Parse, from the quotation in question 1, *flock*, *sheep*, *tall*, *'d.*

Write sentences illustrating the use of *above* as *a*) a prepo-on, *b*) an adverb; *that* as *a*) a conjunction, *b*) a relative noun.

Write a letter to a friend, thanking him for a present that received, and stating why it gave you special pleasure.

Give the third person singular of the following forms of verb *find*: *a*) active, indicative, present, *b*) passive, indica-e, present perfect (perfect), *c*) active, indicative, future, *d*) ive, progressive, indicative, past perfect (pluperfect), *e*) em-atic, past (imperfect).

Select from the following the incorrect sentences and re-te in correct form, giving the reason for each correction: The colonel and his men lost their courage, *b*) The colonel, his men, lost their courage, *c*) Alice and myself planned trip, *d*) The money is to be divided between you and I, She is a girl whom I greatly admire, *f*) It was him who ke, *g*) Neither he nor Charles has finished his work.

Write *a*) an interrogative sentence containing an infinitive ase, *b*) a complex imperative sentence, *c*) an exclamatory ence containing a participial phrase.

Give the part of speech and the syntax of the italicized ls in the following sentences: *a*, *b*) From the valley ahead the *cry* of a *searching* hound, *c*) If she could put that of water between her and her pursuers, she would be *d*, *e*) The hunted doe went down the open, *clearing* the s *splendidly*.

9 Combine the following statements into a simple senten

A boy sat on the chair. The chair was by the window. The boy watc the crowd. He watched with longing eyes. The crowd was on the p ment below.

10 Write sentences illustrating *three* different uses of nominative case, not including the subject nominative.

11 In the following sentences insert in *a*) the correct f of *lie*, *lay;* in *b*) the correct form of *sit*, *set;* in *c*) the cor form of *flow:*

a) I   down to rest, and slept as soon as I   my h on my pillow, *b*) I   in my chair, and as I dozed s one   a vase of flowers on the table by my side, *c*) water has   from the faucet.

12 Explain the meaning of *five* of the italicized word the following:

In the *Acadian* land, on the shores of the Basin of Minas,
Distant, *secluded*, still, the little village of Grand-Pré
Lay in the *fruitful* valley . . .
Dikes, that the hands of the farmers had raised with labor *inces*.
Shut out the turbulent tides; but at stated seasons the *flood-ga*
Opened, and *welcomed* the sea to *wander* at will o'er the mead

13 Give an account of the burning of the village of Gr Pré.

14–15 Write an essay of at least 100 words on *one* of the lowing topics, paying special attention to spelling, capita tion, punctuation, grammatic construction, proper use of w and sentence structure [Essays on subjects other than tl assigned will not be accepted]:

a) Basil and Benedict [Give an account of the conversa between Basil and Benedict just before the contract was sign *b*) A sad reunion [Give an account of the circumstances surroundings under which Evangeline finally found Gabr

NOTE—Pupils not familiar with *Evangeline* may write on *one* of following: *a*) A rainy day, *b*) An intelligent dog.

High School Department

169TH EXAMINATION

ELEMENTARY ENGLISH

Friday, June 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 14–15 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Analyze by diagram or otherwise the following sentence:

Robert E. Lee, having been reared amid southern institutions, and being devoted to the interest of his own state, decided to resign his commission in the United States army.

2 Write sentences containing *a*) the positive degree of the adverb *better*, *b*) the comparative degree of *often*, *c*) the superlative degree of *far*, *d*) the possessive plural of *child*, *e*) the objective case of *we*.

3 Write a letter to a friend, describing your school work during the past year.

4 Give the part of speech and the syntax of *each* of the following italicized words: *a*, *b*) The *fording* of the river threw the hounds *off* for a time, *c*) She leaped forward with *better* speed, *d*) All his attitudes are *free* and unstudied, *e*) Her friends had given her up, *supposing* that she had dragged herself away into the depths of the woods.

5 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) Nobody but the doctor and the nurse was allowed in the room, *b*) Nothing but books and flowers seem to interest her, *c*) Let each one try to do his work well, *d*) They are all going but you and I, *e*) I have no objection to his going, *f*) This building is neither a chapel or a school, *g*) Did you say that the Rhine river flowed through Germany?

6 Write the infinitives and the participles, active and passive, of *weave*.

7 Classify the following sentences as to form and as to use: *a*) How many difficulties were conquered by the stern old Puritans! *b*) Why does one man's yawning make another man yawn? *c*) A statesman makes the occasion, but the occasion makes the politician, *d*) A thoughtful mind, when it sees a nation's flag, sees not the flag, but the nation itself, *e*) Reduce each result to its simplest form and mark it Ans.

8 Write sentences using correctly *a*) the interrogative *who* introducing a subordinate clause, *b*) the relative *who* modifying the object of a preposition, *c*) the interrogative *which* modifying a noun, *d*) the relative pronoun *which*, *e*) *that* introducing an adverbial clause.

9 Parse the italicized words in the following sentences: *a*) The hounds were drawing *near*, *b*) He had *nothing* whatever to give his child,—nothing but his sympathy, *c*) His haunch is as tender as his *heart*, *d*) The *American* deer in the wilderness, left to himself, leads a comparatively harmless life.

10 Combine the following statements into a complex sentence: The doe reached the timber. She heard the brutes. The brutes were savage. The brutes were howling. The brutes were across the meadow.

11 Give the syntax of *three* of the following italicized phrases: *a*) The fearful pace *at which* she had been going told upon her, *b*) Every bird in town came *to see that owl*, *c*) I suspect the jay is often punished by birds which are otherwise innocent *of nest-robbing*, *d*) It is easy *to mistake them* for trails made by hunters, *e*) The baying *of the hounds* grew fainter behind her.

12 Explain the meaning of *five* of the italicized words in the following:

a Many a *weary* year had passed since the burning of Grand-Pré
When on the *falling* tide the *freighted* vessels departed.

b Here is Baptiste Leblanc, the *notary's* son, who has loved thee
Many a tedious year.

c Still in her heart she heard the funeral *dirge* of the ocean.

d Water-lilies in *myriads* rocked on the slight *undulations*.

e Far in the west there lies a desert land, where the mountains
Lift, through perpetual snows, their lofty and *luminous* summits.

f Slowly over the tops of the Ozark mountains the moon rose . . .
Touching the *sombre* leaves, and embracing and filling the woodland.

13 Narrate the circumstances that caused the separation of Evangeline and Gabriel.

14–15 Write an essay of at least 100 words on *one* of the following topics, paying special attention to spelling, capitalization, punctuation, grammatic construction, proper use of words and sentence structure [Essays on subjects other than those assigned will not be accepted]:

a) An eventful evening [Suppose yourself a visitor at Evangeline's home the evening the notary came; write your cousin an account of the evening], *b*) Two Acadian children [Describe the early life of Evangeline and Gabriel].

NOTE—Pupils not familiar with *Evangeline* may write on *one* of the following: *a*) One day at recess, *b*) Kindness to animals.

High School Department

165TH EXAMINATION

ADVANCED ENGLISH

August 1900 — Three hours, only

Answer questions 13–15 and seven of the others but **no more.** *If more* *an seven of the others are answered only the first seven answers will* *considered. Each complete answer will receive 10 credits. Papers* *titled to 75 or more credits will be accepted.*

1 There is a time in every man's education when he arrives at the con- :tion that envy is ignorance; that imitation is suicide; that he must take *nself*, for better, for *worse*, as his portion; that though the wide uni- rse is *full* of good, no kernel of nourishing corn *can come* to him *but* rough his toil *bestowed* on that plot of ground which *is given him to till.*

Select from the above quotation an adjective clause, a noun ause, an adverb clause, and give the syntax of each clause lected.

2 Parse, from the quotation in question 1, *himself*, *full*, *can me*, *is given.*

3 Give, from the quotation in question 1, the part of speech nd the syntax of *worse*, *but*, *bestowed*, *him*, *to till.*

4 Correct the following sentences and give the reason for ach correction: *a*) While passing your house yesterday your og ran out and frightened my horse, *b*) I meant to have told ou about it this morning, *c*) Nearly every one of the exercises ne gave we had mistakes in them, *d*) Either one or the other re incorrect, *e*) Education always has and always will be ecessary to success.

5 Combine the following into a single sentence, changing the rst statement to a phrase and the third statement to a clause f time:

It was a bright, clear day. It was in the month of December. was returning to my home. I saw a child lying asleep on ne doorstep. I recognized the child as John's long lost son.

6 Give the syntax of the italicized words in the following: The *carriage* having gone, we were obliged to walk, *b*) Wash- ton was called the greatest *general* of his time, *c*) *John*, you Robert may leave when Joseph comes, *d*) He was given a *me* of Longfellow's poems, *e*) I walked a *mile* each day.

7 Write a letter to a friend, proposing a pleasure trip and stating some of the attractions of the trip.

8 Write sentences illustrating the following: *as* introducing *a*) a clause of degree, *b*) an adjective clause; *where* introducing *a*) an adverb clause of place, *b*) an adjective clause; *that* introducing an adverb clause of result.

9 Give the syntax of the italicized words in the following: *a*) It would please us *to go* with you, *b, c*) All we want is *to see* him *succeed*, *d*) He is tired of *wasting* his time, *e*) The boy ought not *to have loitered* on the way.

10 In the following sentences, change the infinitive phrases and the participial phrases to subordinate clauses and give the syntax of each subordinate clause thus formed: *a*) I wished the days to pass swiftly, *b*) I went to the well to get some water, *c*) I found an example to analyze, *d*) My aunt, impressed by my arguments, yielded, *e*) The birds, having migrated southward, were missed from their haunts.

11 Explain the difference between a compound word and a derivative word. Give *two* examples of each and show in each case the composition or derivation.

12 Give an account of the principal changes made in the English language by the Norman conquest.

13–15 Write an essay of at least 150 words on *one* of the following topics, paying special attention to spelling, punctuation, grammatic construction and proper use of words; also some attention to introduction, proper grouping of ideas into paragraphs and pleasant transition between sentences [Essays on subjects other than those assigned will not be accepted]:

a) The value of the Chautauqua course as a promoter of higher education, *b*) My walk to school, *c*) A country store.

High School Department

166TH EXAMINATION

ADVANCED ENGLISH

Tuesday, September 25, 1900—1.15 to 4.15 p. m., only

Answer questions 13–15 and seven of the others but **no more.** *If more than seven of the others are answered only the first seven answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 There are *certain* half-dreaming *moods* of mind, *in which* we naturally steal away from noise and glare, and *seek* some quiet haunt, where we may build our air castles *undisturbed.*

Write out each clause in the above quotation, state the kind of clause and give the syntax of each subordinate clause.

2 Parse, from the quotation in question 1, *certain*, *moods*, *seek*, *undisturbed.* Give the syntax of the phrase *in which.*

3 Give the syntax of *three* of the italicized infinitives in the following: *a*, *b*) He came *to inform* me that it was time *to close* the library, *c*) I was just about *to launch* forth into eulogiums, *d*) Its language, *to be* sure, was rather quaint and obsolete, *e*) It may not be unacceptable to my untraveled readers *to have* a sketch that may serve as a representation of this important class of functionaries.

4 Give the syntax of the italicized words in the following sentences: *a*) He has commonly a broad, full face curiously *mottled* with red, *b*) He has a pride in *having* his clothes of excellent materials, *c*) He abandons the cattle to the care of the hostler, his duty *being* merely to drive from one stage to another, *d*) The pony stood *dozing* quietly by the roadside.

5 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) Passing from room to room, new attractions are brought to our notice, *b*) I knew it to be him as soon as I saw him, *c*) Each of those to whom you sell a coupon sends it to us, purchasing a book of five coupons for themselves, *d*) The jury separated because it could not agree on a verdict, *e*) The firing of the gun alarmed the neighbors, *f*) Spain has more sunshine than any country in Europe, *g*) The colonel, not his men, lost his courage.

6 Write sentences containing *three* of the following: *a*) an adverbial clause of manner, *b*) an adverbial clause of concession, *c*) an adjective clause modifying the subject of a sentence, *d*) a noun clause used as an explanatory modifier (appositive), *e*) a noun clause used as an attribute complement.

7 Combine the following into a complex sentence, changing the second statement to a participial phrase, and the fourth and fifth statements to an adjective clause:

Toward evening Columbus returned to his ships. He was accompanied by many of the islanders. The islanders were in canoes. The canoes were rudely formed out of the trunk of a single tree. The canoes were so light that they could be easily paddled.

8 Write sentences containing phrases denoting *three* of the following: *a*) agency, *b*) place from which, *c*) means, *d*) accompaniment, *e*) limit of motion.

9 Give the syntax of the following italicized words: *a*, *b*, *c*, *d*) I would have a *rule* passed that the dean should pay *each* of us a *visit* at least once a *year*, *e*) No one could have toiled harder than *he* for immortality.

10 Describe the stag hunt as pictured in the *Lady of the lake*.

11 Give, from the *Lady of the lake*, a description of Loch Katrine and its surroundings, and state the impressions the scene made on King James.

12 Write, in Ellen's name, a letter to her father, describing her first meeting with King James, as given in the *Lady of the lake*.

13–15 Write an essay of at least 150 words on *one* of the following topics, paying special attention to spelling, punctuation, grammatic construction and proper use of words; also some attention to introduction, proper grouping of ideas into paragraphs and pleasant transition between sentences [Essays on subjects other than those assigned will not be accepted]: *a*) Great inventions, *b*) My favorite author.

High School Department

167TH EXAMINATION

ADVANCED ENGLISH

Monday, January 21, 1901 — 1.15 to 4.15 p. m., only

Answer questions 13–15 and seven of the others but **no more.** *If more than seven of the others are answered only the first seven answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 As I looked around on the old volumes in their moldering covers, *thus* ranged on the shelves, and apparently never *disturbed* in their repose, I could not *but* consider the library a *kind* of literary catacomb, *where* authors, like mummies, are piously entombed, and left to blacken and molder in dusty oblivion.

Write out each clause in the above quotation, state the kind of clause and give the syntax of each subordinate clause (not of the words within the clause).

2 Give, from the quotation in question 1, the part of speech and the syntax of *thus*, *disturbed*, *but*, *kind*, *where*.

3 Write a letter of congratulation to a friend who has recently been graduated.

4 Give the syntax of *three* of the italicized infinitives in the following: *a*) I was pleased *to see* the fondness with which the little fellows leaped about the steady old footman, *b*) The sooty specter permits the asthmatic engine *to heave* a long-drawn sigh, *c*) All wanted *to mount* at once, *d*) We stopped a few moments afterwards *to water* the horses, *e*) *To discuss* all these at an inn was impossible.

5 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) I should have been frightened if I were alone in the house, *b*) I expected to go to the Paris exposition, *c*) Having conducted parties over the route for several years, he knew all the dangerous places, *d*) Hurrying to catch the train, his coat was lost, *e*) Nobody could have entered the room without the watchman knowing it, *f*) Nothing but disgrace and dishonor awaits him, *g*) What list of synonyms are used for drill work?

6 Give the syntax of the italicized words in the following sentences: *a*) It was buried *deep* among the massive walls of the abbey, *b*) I leaned out of the coach window, in hopes of *witnessing* the happy meeting, *c*) He insisted that I should give *him* a day or two at his father's country-seat, *d*) It lay a few *miles* distant, *e*) What would you say to libraries such *as* actually exist, containing three or four hundred thousand volumes

7 Write sentences containing *three* of the following: *a*) an adverbial clause of result (consequence), *b*) an adverbial clause of condition, *c*) a noun clause used as an object complement (direct object), *d*) a noun clause used as the principal term of a prepositional phrase, *e*) an adjective clause modifying an attribute complement (predicate nominative).

8 Write sentences containing phrases denoting *three* of the following: *a*) accompaniment, *b*) instrument, *c*) agency, *d*) place in which, *e*) place from which.

9 Change the italicized phrases in the following to subordinate clauses, and give the syntax of each subordinate clause: *a*) It complained bitterly *of not having been opened* for more than two centuries, *b*) He built a pyramid of books *to perpetuate his name*, *c*) At first the voice of the book was very hoarse and broken, *being much troubled* by a cobweb woven across it.

10 Combine the following into a complex sentence containing an adverbial clause of time and an adjective clause:

The cloth was removed. The butler brought in a huge vessel. The vessel was silver. The vessel was of rare and curious workmanship. The butler placed the vessel before the squire.

11 Explain the meaning of *five* of the italicized words in the following:

a Less loud the sounds of *sylvan* war
Disturbed the hights of Uam-Var.

b And many a gallant, stayed perforce,
Was *fain* to *breathe* his faltering horse.

c With flying foot the *heath* he spurned.

d That horseman *plied* the scourge and steel.

e Woe *worth* the chase, woe worth the day,
That costs thy life, my gallant gray!

f Her satin *snood*, her silken *plaid*,
Her golden brooch, such birth betrayed.

12 Give an account of Roderick's return from the lowland raid, and describe the welcome accorded him.

13–15 Write an essay of at least 150 words on *one* of the following topics, paying special attention to spelling, punctuation, grammatic construction and proper use of words; also some attention to introduction, proper grouping of ideas into paragraphs and pleasant transition between sentences [Essays on subjects other than those assigned will not be accepted]:

a) A highland welcome [Let James 5 describe his first visit to the island retreat of Douglas], *b*) The gathering of the clan [Give an account of the summons by the fiery cross].

NOTE—Students not familiar with *Lady of the lake* may write on *one* of the following: *a*) Books as educators, *b*) Good resolutions.

High School Department

168TH EXAMINATION

ADVANCED ENGLISH

Wednesday, March 27, 1901 — 1.15 to 4.15 p. m., only

Answer questions 13–15 and seven of the others but **no more.** *If more than seven of the others are answered only the first seven answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Wave after wave of succeeding literature has rolled over them, until they are buried so deep, that it is only now and then that some industrious diver after fragments of antiquity brings up a specimen for the gratification of the curious.

Write out each clause in the above quotation, state the kind of clause and give the syntax of each subordinate clause (not of the words within the clause).

2 But I fear *all will be in vain: let* criticism *do what* it may, writers will write, printers will print, and the world will inevitably be overstocked with good books.

Give, from the above quotation, the syntax of the clause *all will be in vain;* parse *let*, *do*, *what*.

3 Write sentences containing *three* of the following: *a*) *as* introducing an adverbial clause of degree, *b*) *that* introducing a clause of purpose, *c*) *only* used as an adjective, *d*) a noun clause used as an explanatory modifier (appositive) of the object of a sentence, *e*) an adverbial clause of concession.

4 Write a letter to a dry goods firm in a distant city, ordering a bill of goods. Give the necessary details.

5 In the following sentences change the infinitive in *a*) to a clause of purpose, in *b*) to a noun clause; the participial phrase in *c*) to an adjective clause, in *d*) to a clause of cause:

a) Books were written to give pleasure, *b*) I determined not to give up my point, *c*) At the end of the lane was an old sober-looking servant in livery, waiting for them, *d*) He is always a personage full of care and business, but he is particularly so at this season, having so many commissions to execute.

6 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) Every door and every window were opened to let in the air, *b*) Economy, as well as industry, is necessary to achieve the desired result, *c*) Scott was not only a writer of prose but also of poetry, *d*) I intended to tell you all about it this morning, *e*) When I first came, I meant to have bought the house, *f*) It is the greatest spectacle the world ever has or ever will witness, *g*) There seems to be no one to take the trip but you and me.

7 Give the syntax of *three* of the italicized infinitives in the following: *a*) I am tempted *to illustrate* them by some anecdotes of a Christmas passed in the country, *b*) Bantam, I found *to be* a pony, *c*, *d*) It was delightful *to hear* the gigantic plans

of the little rogues, and the impracticable feats they were *to perform*, *e*) One work was often erased *to make* way for another.

8 Combine the following statements into a complex sentence, changing the fourth statement to an adjective clause, and the fifth statement to a clause of time:

The fair lady of Castlewood found the occupant of the gallery. He was sad and lonely. He was busy over his great book. He laid down his book. He became aware that a stranger was near.

9 Parse the italicized words in the following: *a*) They pronounced him *one* of the best fellows in the world, *b*, *c*) All possible encouragement, therefore, *should be given* to the growth of critics, good or *bad*, *d*, *e*) I felt somewhat nettled at his rudeness, *which*, however, I pardoned on account of *his* having flourished in a less polished age.

10 Select from the following italicized phrases, a phrase denoting limit of motion, means or instrument, place from which:

a) The roof was supported *by massive joists* of old English oak, *b*) I found myself *in a lofty antique hall*, *c*) As if language ever sprang *from a well* or fountainhead, *d*) A whole crowd of authors who wrote and wrangled at the time, have likewise gone down, *with all their writings* and their controversies, *e*) Every one runs *to the window*.

11 Explain the meaning of *five* of the italicized words in the following:

The stag at eve had drunk his fill,
Where *danced* the moon on *Monan's* rill,
And deep his midnight *lair* had made
In lone Glenartney's *hazel* shade;
But when the sun his *beacon* red
Had kindled on *Benvoirlich's* head,
The *deep-mouthed* bloodhound's heavy bay
Resounded up the rocky way.

12 Give an account of the experiences of Douglas from the time he entered Stirling park till the close of the sports.

13–15 Write an essay of at least 150 words on *one* of the following topics, paying special attention to spelling, punctuation, grammatic construction and proper use of words; also some attention to introduction, proper grouping of ideas into paragraphs and pleasant transition between sentences [Essays on subjects other than those assigned will not be accepted]:

a) Blanche of Devan [Describe the encounter of James Fitz-James with the lowland maid], *b*) An audience with the king [Describe the scene in the audience chamber at Stirling castle when Scotland's king redeemed his signet ring].

NOTE—Students not familiar with *Lady of the lake* may write on *one* of the following: *a*) An errand of mercy, *b*) The future of America.

High School Department

169TH EXAMINATION

ADVANCED ENGLISH

Monday, June 17, 1901 — 1.15 to 4.15 p. m., only

Answer questions 13–15 and seven of the others but **no more.** *If more than seven of the others are answered only the first seven answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 "I *declare*," added I, with some emotion, "when I contemplate a modern library, *filled* with new works, in all the bravery of rich gilding and binding, I feel *disposed* to sit down and *weep*; like the good Xerxes, when he surveyed his army and reflected that *in 100 years* not one of them would be in existence!"

Select, from the above quotation, *two* noun clauses and an adverbial clause. Give the syntax of each clause selected (not of the words within the clause).

2 Parse, from the quotation in question 1, *declare*, *filled*, *disposed*, *weep*. Give the syntax of the phrase *in 100 years*.

3 Write sentences containing *three* of the following: *a*) *what* used as an adjective, *b*) a participial phrase used as the object of a preposition, *c*) an infinitive phrase denoting purpose, *d*) a participial phrase denoting time, *e*) an adverbial clause of result (consequence).

4 Write a notice advertising an article of value that you have found. Give necessary details.

5 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) Driving down the hill, the wheel came off of the wagon, *b*) He is a man whom I know is honest, *c*) He is a man whom I know to be honest, *d*) Give it to whoever seems to need it most, *e*) Had I known it, I might have been able to have prevented the accident, *f*) He expected to see you tomorrow, *g*) If it had been me, they would not have waited so long.

6 Distinguish in meaning between the sentences in *each* of the following pairs: *a*) Much depends on the person correcting the exercise; Much depends on the person's correcting the exercise, *b*) He gave the boy sixpence; He gave the boy six pennies, *c*) If she disobeyed she would be punished; If she disobeyed she should be punished, *d*) Let me alone; Leave me alone.

7 Rewrite the following sentences, changing the italicized djective in *a*) to an adjective phrase, in *b*) to an adjective

clause; the italicized adverb in *c*) to an adverbial phrase; the italicized phrase in *d*) to an adverbial clause of purpose: *a*) *Western* scenery appeals to the lover of nature, *b*) He owns a *valuable* horse, *c*) The letter was *carefully* written, *d*) He studied diligently *for fame* in his profession.

8 I *was written* in my own native tongue, *at a time when* the language had become *fixed;* and indeed I was considered a *model* of pure and elegant English.

Parse, from the above quotation, *was written*, *when*, *fixed*, *model*. Give the syntax of the phrase *at a time*.

9 Combine the following statements into a compound sentence of two members, the first member to contain an adjective clause, the second to contain an adverbial clause of cause:

There were several dishes. The dishes were quaintly decorated. The dishes had evidently something traditional in their embellishments. I did not ask questions about them. I did not like to appear over curious.

10 Write sentences containing *a*) a phrase denoting means, *b*) a phrase denoting agency, *c*) a clause denoting condition, *d*) a clause denoting place, *e*) a clause denoting manner.

11 Explain the meaning of *five* of the italicized words in the following:

Then, dashing down a *darksome* glen,
Soon lost to hound and hunter's *ken*,
In the deep *Trosachs'* wildest nook
His *solitary* refuge took.

I little thought, when first thy rein
I slacked upon the banks of *Seine*,
That *highland* eagle e'er should feed
On thy fleet limbs, my matchless steed!

Each purple peak, each flinty spire,
Was *bathed* in floods of *living* fire.

12 Explain why the king wished to secure Douglas.

13–15 Write an essay of at least 150 words on *one* of the following topics, paying special attention to spelling, punctuation, grammatic construction and proper use of words; also some attention to introduction, proper grouping of ideas into paragraphs and pleasant transition between sentences [Essays on subjects other than those assigned will not be accepted]:

a) At Coilantogle's ford [Describe the combat between Fitz-James and Roderick Dhu], *b*) A knight's devotion [Let Ellen tell in after years of her interview with James 5 when he came to Coir-Uriskin to bear her from the scenes of war].

NOTE—Students not familiar with *Lady of the lake* may write on *one* of the following: *a*) Summer pleasures, *b*) Good manners.

High School Department

167TH EXAMINATION

ENGLISH—First Year

Monday, January 21, 1901—1.15 to 4.15 p. m., only

nswer 10 questions but **no more,** *including at least five questions n the first division. If more than 10 are answered only the first answers will be considered. Each complete answer will receive 10 dits. The whole paper will be criticized as an exercise in English osition. Papers entitled to 75 or more credits will be accepted.*

1 While I sat half murmuring, half *meditating* these unprofitable *speculations with my head* resting on my hand, I was thrumming 1 the other hand upon the quarto, until I accidentally loosened the clasps; n *to my utter astonishment,* the little book gave two or three yawns; 1 a husky *hem;* and at length began to talk.

elect, from the above quotation, *three* subordinate clauses l give the syntax of each clause selected (not of the words hin the clause).

Give, from the quotation in question 1, the syntax of the owing: *meditating, speculations, with my head, to my utter nishment, hem.*

Write sentences containing *three* of the following: *a*) *where* roducing an adjective clause, *b*) *as* introducing an adverbial use of manner, *c*) *who* introducing a noun clause, *d*) an in- tive phrase used independently, *e*) an adverb modifying a positional phrase.

Write a letter to a friend who is visiting in a distant city, cribing an interesting event that has taken place since he nt away.

Give the part of speech and the syntax of the italicized words the following: *a*, *b*) Hares hung *dangling* their long ears ut the coachman's box, *presents* from distant friends for the pending feast, *c*) I had three fine rosy-cheeked boys for my ow-passengers *inside*, *d*, *e*) They were returning *home* for holidays in high glee, and promising *themselves* a world of oyment.

Give the syntax of *three* of the italicized infinitives in the owing: *a*) The glossy branches of holly, with their bright berries, began *to appear* at the windows, *b*) It will soon be employment of a lifetime merely *to learn* their names, *c*) preparation I had seen had made me *feel* a little impa- t, *d*) He was going *to pass* the holidays at his father's try-seat, *e*) Whether it was another of those odd day-dreams hich I am subject, I have never been able *to discover.*

7 Write sentences containing phrases denoting *three* of the following: *a*) agency, *b*) limit of motion, *c*) accompaniment, *d*) place in which, *e*) instrument.

8 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) His ideas are similar to the committee, *b*) If he received your letter he would have come, *c*) He ought to have gone before the messenger arrived, *d*) We hope we may have a line from every one who receives a circular, *e*) Every one who have pews in this church, is a supporter of the church, *f*) Writing of letters is a difficult task for some people, *g*) The ringing of the bells alarmed the children.

Second division 9 Give an account of Ellen's visit to Stirling castle.

10 Explain the meaning of *five* of the italicized words in the following:

Harp of the north! that moldering long hast hung
On the *witch-elm* that shades Saint Fillan's spring,
And down the *fitful* breeze thy *numbers flung*,
Till *envious* ivy did around thee cling,
Muffling with *verdant ringlet* every string,—
O minstrel harp, still must thine accents sleep?

11 Describe the reception of Prior Aymer and Brian de Bois-Guilbert, by Cedric at Rotherwood.

12 Give, from *Snow-bound*, an account of the day after the storm.

13 Give an account of the interview between John Alden and Priscilla immediately after the departure of the Mayflower.

14 Give, from "The voyage," a description of the scenes and of the incidents that occurred from the time land was sighted to the end of the voyage.

15 Write a description of Ichabod Crane and mention *three* traits of his character.

High School Department

169TH EXAMINATION

ENGLISH — First Year

Monday, June 17, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more,** *including at least five questions from the first division. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. The whole paper will be criticized as an exercise in English composition. Papers entitled to 75 or more credits will be accepted.*

First division

1 And *such*, he *anticipates*, will be the *fate* of his own work, *which*, however it may be admired in its day, and *held* up as a *model* of purity, will in the course of years grow *antiquated* and obsolete; until it shall become almost *as unintelligible* in its native land as an Egyptian obelisk, or one of those Runic inscriptions said *to exist* in the deserts of Tartary.

Select, from the above quotation, a noun clause, *two* adverbial clauses. Give the syntax of each clause selected (not of the words within the clause).

2 Give, from the quotation in question 1, the part of speech and the syntax of *such*, *fate*, *model*, *antiquated*, the first *as* in line 4.

3 Parse, from the quotation in question 1, *anticipates*, *which*, *held*, *unintelligible*, *to exist*.

4 Write sentences containing *three* of the following: *a*) *when* introducing an adjective clause, *b*) *as* introducing an adjective clause, *c*) *where* introducing a noun clause, *d*) *that* introducing a clause of result, *e*) *but* introducing a clause of result.

5 Write a letter to a friend inviting her to visit you on July fourth. Describe the arrangements made for a picnic on that day.

6 Give the syntax of the italicized words in the following sentences: *a*, *b*) An irruption of madcap boys from Westminster school, *playing* at foot-ball, broke in upon the monastic stillness of the place, making the vaulted passages and moldering tombs *echo* with their merriment, *c*, *d*) I sought *to take* refuge from their noise by *penetrating* still deeper into the solitudes of the pile, *e*) I found myself in a lofty antique hall, the roof *supported* by massive joists of old English oak.

7 Select from the following italicized phrases, a phrase denoting accompaniment, a phrase denoting agency, a phrase denoting place in which: *a*) It was soberly lighted *by a ro-*

of Gothic windows at a considerable hight *from the floor*, *b*) I found myself *in a lofty antique hall*, *c*) Authorship was a limited and unprofitable craft, pursued chiefly *by monks* in the leisure and solitude of their cloisters, *d*) He was a sprightly good-humored young fellow, *with whom* I had once traveled on the continent.

8 Select from the following the incorrect sentences and rewrite in correct form, giving the reason for each correction: *a*) He asked for either a grammar or dictionary, *b*) They held a successful bazar to clear off the debt on the building, and which netted $500, *c*) We have done no more than it was our duty to do, *d*) Him who is suspicious of others, we are apt to suspect, *e*) Books, as well as art, give her pleasure, *f*) Music, and not flowers, are her delight, *g*) This is very different than the one mentioned.

Second division 9 Tell the story of Malcolm Graeme as given in the *Lady of the lake*.

10 Explain the meaning of *five* of the italicized words in the following:

a So spake the captain of Plymouth, and strode about in the chamber,
Chafing and *choking* with rage.

b Straightway the captain paused, and, without further question or *parley*,
Took from the nail on the wall his sword with its *scabbard* of iron.

c Thus as he spake, he turned . . . and hurried along in the twilight,
Through the *congenial* gloom of the forest *silent* and *sombre*.

d I have fought 10 battles and *sacked* and demolished a city.

e Meanwhile the *choleric* captain strode wrathful away to the council.

11 Account for Cedric's interest in Lady Rowena.

12 Sketch the scene in which John Alden gives the message of Miles Standish to Priscilla.

13 Describe Mr Simon Bracebridge (Master Simon) and give the story of his life.

14 Describe the character of the coachman as given in the "Stage coach."

15 Give, from *Snow-bound*, an account of the manner in which the family spent the evening after the storm.

High School Department

167TH EXAMINATION

ENGLISH — Second Year

Tuesday, January 22, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least three from the rst division. If more than 10 are answered only the first 10 answers ill be considered. Each complete answer will receive 10 credits. The hole paper will be criticized as an exercise in English composition. ipers entitled to 75 or more credits will be accepted.*

1 Develop the following topic sentence into a paragraph on of at least 75 words: It is evident that this is an age of ogress.

2 Show how either unity or continuity (sequence of thought) secured in the structure of the following paragraph:

Let the sacred obligations which have devolved on this generation, and on , sink deep into our hearts. Those who established our liberty and our vernment are daily dropping from among us. The great trust now descends new hands. Let us apply ourselves to that which is presented to us, as r appropriate object. We can win no laurels in a war for independence. rlier and worthier hands have gathered them all. *Nor* are there places : us by the side of Solon, and Alfred, and other founders of states. Our hers have filled them. *But* there remains to us a great duty of defense d preservation; *and* there is opened to us, also, a noble pursuit, to which e spirit of the times strongly invites us.

3 Show, by explaining the use of the italicized connectives, w transition in the above paragraph is secured.

4 Give the name of the figure in *each* of the following quotaons and explain the comparison in each case:

a But I am constant as the northern star,
Of whose true-fix'd and resting quality
There is no fellow in the firmament.

b The path of a good woman is indeed strewn with flowers: but they rise behind her steps, not before them.

5 Mention the rhetorical defect in *each* of the following sennces and correct each sentence: *a*) We were alarmed by a ight light that appeared in one of the windows of an old, uncupied house that had the reputation of being haunted, *b*) ll him, while he is in the city, to attend to the matter, *c*) We nt across a field (the field was covered with wheat) that sloped ntly toward a river, *d*) The pale hand of death stalked into midst last week, *e*) He has passed the noontide of life and apidly getting old.

6 Mark the scansion of the following lines and give the prevailing foot and meter of each selection:

a It seemed the dark castle had gathered all
Those shafts the fierce sun had shot over its wall
In his siege of three hundred summers long.

b He prayeth best, who loveth best
All things both great and small;
For the dear God who loveth us,
He made and loveth all.

c From scenes like these, old Scotia's grandeur springs
That makes her lov'd at home, rever'd abroad.

Second division

7 Describe, from "Howe's masquerade," the appearance of the last of the spectral governors, explaining its significance.

8 Give an account of the home life and amusements of Sir Roger de Coverley.

9 Ruskin says, in *Sesame and lilies*, "For all books are divisible into two classes, the books of the hour, and the books of all time."

Show in detail what Ruskin means by the "books of the hour" and the "books of all time."

10 Describe the experiences of the ancient mariner after he heard the two voices.

11 Give, from the *Cotter's Saturday night*, a description of the household devotions.

12 Sketch the scene in which Sir Launfal finds the holy grail.

13 Mention *two* important events in the life of Silas Marner and show the effect of each on his character.

14 Give Casca's account of Caesar's refusal of the crown.

15 State the connection of *each* of the following with the literature studied in this course: Dunstan Cass, Father Hooper, Portia, Dominicus Pike, Will Wimble.

High School Department

169TH EXAMINATION

ENGLISH — Second Year

Tuesday, June 18, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least three from the first division. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. The whole paper will be criticized as an exercise in English composition. Papers entitled to 75 or more credits will be accepted.*

First division

1 Develop the following topic sentence into a paragraph of at least 75 words: Addison has depicted a very interesting character in Sir Roger de Coverley.

2 In the following paragraph state *a*) the topic sentence, *b*) the relation of the second sentence to the first sentence, *c*, *d*) the relation of the third and of the fourth sentence to the second sentence, *e*) the characteristic of the last sentence that makes it a good conclusion:

Let our age be the age of improvement. In a day of peace, let us advance the arts of peace and the works of peace. Let us develop the resources of our land, call forth its powers, build up its institutions, promote all its great interests, and see whether we also, in our day and generation, may not perform something worthy to be remembered. Let us cultivate a true spirit of union and harmony. In pursuing the great objects which our condition points out to us, let us act under a settled conviction, and an habitual feeling, that these 24 states are one country. Let our conceptions be enlarged to the circle of our duties. Let us extend our ideas over the whole of the vast field in which we are called to act. Let our object be, our country, our whole country, and nothing but our country.

3 Mention the rhetorical defect in *each* of the following sentences and correct each sentence: *a*) He has written a biographic sketch of the life of Lincoln, *b*) I intended the day I arrived to visit the different places of interest, *c*) George Washington (he was called the father of his country) was the first president of the United States, *d*) I guess I am going to be away all summer, *e*) This book was written by a man of keen observance.

4 Mention the figure found in the following paragraph, tracing in detail the points of comparison:

If the true spark of religious and civil liberty be kindled, it will burn. Human agency can not extinguish it. Like the earth's central fire, it may be smothered for a time; the ocean may overwhelm it; mountains may press it down; but its inherent and unconquerable force will heave both the ocean and the land, and at some time or other, in some place or other, the volcano will break out and flame up to heaven.

5 Prepare an outline for an essay on *one* of the following topics, making sufficient subdivisions to show what matter you intend to include in the essay: *a*) A heroic deed, *b*) The opportunities of an educated man or woman.

6 In the following stanza mark the scansion of the first *two* lines, stating *a*) the prevailing foot and meter, *b*) the position of the cesura; give an example of run-on lines, masculine rime:

> The drawbridge dropped with a surly clang,
> And through the dark arch a charger sprang,
> Bearing Sir Launfal, the maiden knight,
> In his gilded mail, that flamed so bright
> It seemed the dark castle had gathered all
> Those shafts the fierce sun had shot over its wall
> In his siege of three hundred summers long.

Second division

7 Describe, from the "Prophetic pictures," the scene of the fulfilment of the painter's prophecy. State the moral of this tale.

8 Give, from the *Sir Roger de Coverley papers*, a description of Will Wimble.

9 Give, from *Sesame and lilies*, an account of what Ruskin says in regard to novel reading.

10 State the theme of the *Ancient mariner* and show how the theme is brought out in the development of the poem.

11 Describe the family life of the Scotch peasants as illustrated in the *Cotter's Saturday night*.

12 Write a description of a day in June, based on Lowell's *Vision of Sir Launfal*.

13 Give, from *Silas Marner*, Eppie's reasons for not returning to Godfrey.

14 Explain how Brutus was made to turn against Caesar.

15 Give, from the *First Bunker hill oration*, a sketch of what Webster says regarding the changes that have taken place since the battle of Bunker hill, touching on the following: *a*) diffusion of knowledge, *b*) improvements in the personal condition of individuals, *c*) representative system of government.

High School Department

167TH EXAMINATION

ENGLISH—Third Year

Wednesday, January 23, 1901—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. The whole paper will be criticized as an exercise in English composition. Papers entitled to 75 or more credits will be accepted.*

1 Write a description of a tree from which a swing might easily be suspended.

2 Narrate an incident connected with the tree mentioned in question 1, using the following items: child, swing, band of gipsies.

3 Noon in the country is very still: the birds do not sing; the workmen are not in the field; the sheep lay their noses to the ground; and the herds stand in pools under shady trees, lashing their sides, but otherwise motionless. The mills upon the brook far above have ceased for an hour their labor; and the stream softens its rustle, and sinks away from the sedgy banks. The heat plays upon the meadow in noiseless waves, and the beech-leaves do not stir.

Classify the description illustrated in the above paragraph as impressional or circumstantial. Justify your classification by references to the paragraph.

4 Show, by reference to each poem, how the parallel structure of *L'allegro* and *Il penseroso* is maintained.

5 Explain the meaning of the following quotation from *Comus*, and show how it is connected with the theme of the poem:

> Love virtue, she alone is free;
> She can teach ye how to climb
> Higher than the sphery chime:
> Or, if virtue feeble were,
> Heav'n itself would stoop to her.

6 Give, from the *Conduct of the understanding*, Locke's discussion of the value of similes.

7 Macaulay says, in his *Essay on Milton*, "There is only one cure for the evils which newly acquired freedom produces." Mention and explain the cure to which Macaulay refers.

8 Give Carlyle's estimate of Burns as a writer of song.

9 Explain what Emerson means by the law of compensation and give from his essay *one* statement illustrating this law.

10 Give in detail *three* reasons why Arnold's *Sohrab and Rustum* is entitled to a high place in literature.

11 Give the substance of Portia's remarks to Bassanio immediately after his selection of the casket and show what traits of character are revealed in this speech.

12 Give, from *As you like it*, an incident illustrating each of *three* of the following: *a*) faithfulness, *b*) generosity, *c*) jealousy, *d*) remorse, *e*) melancholy.

13 Write a description of the Esmond household in Virginia.

14 Give an account of George Warrington's escape from Fort Duquesne as told by him to the Lambert family.

15 Write on *one* of the following topics: *a*) Combat between Sohrab and Rustum, *b*) Merits and defects of Pope's *Essay on criticism*, *c*) The story of Lorenzo and Jessica.

High School Department

169TH EXAMINATION

ENGLISH — Third Year

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. The whole paper will be criticized as an exercise in English composition. Papers entitled to 75 or more credits will be accepted.*

1 Write a description of a large dog that is a general favorite among children.

2 Narrate an incident connected with the dog mentioned in question 1, using the following items: picnic, child, water.

3 There was a sloping lawn, a fine stream winding at the foot of it, and a tract of park beyond, with noble clumps of trees, and herds of deer. At a distance was a neat hamlet, with the smoke from the cottage chimneys hanging over it; and a church with its dark spire in strong relief against the clear, cold sky. The house was surrounded with evergreens, according to the English custom. A robin, perched upon the top of a mountain ash that hung its clusters of red berries just before my window, was basking himself in the sunshine, and piping a few querulous notes; and a peacock was displaying all the glories of his train, and strutting with the pride and gravity of a Spanish grandee, on the terrace walk below.

Classify the description illustrated in the above paragraph as impressional or circumstantial. Justify your classification by references to the paragraph.

4 Trace in detail the points of similarity and difference in the following quotations from *L'allegr.* and *Il penseroso:*

a Hence, loathèd melancholy,
Of Cerberus and blackest midnight born,
In Stygian cave forlorn,
'Mongst horrid shapes, and shrieks, and sights unholy!
Find out some uncouth cell,
Where brooding darkness spreads his jealous wings,
And the night-raven sings.

b Hence, vain deluding joys,
The brood of folly without father bred!
How little you bested,
Or fill the fixèd mind with all your toys!
Dwell in some idle brain,
And fancies fond with gaudy shapes possess,
As thick and numberless
As the gay motes that people the sun-beams.

5 State why *Comus* is called a mask. Give the subject matter · this poem.

6 There is scarce anything harder in the whole conduct of the understanding than to get a full mastery over it.

Mention *three* illustrations given by Locke to prove the above statement, explaining them somewhat in detail.

7 Give, from the *Essay on criticism*, Pope's opinion in regard to criticism in England, including his estimate of the critics to whom he refers.

8 Give Macaulay's criticism of Milton's essay on the *Doctrine of Christianity*, touching on the rhetorical style and the subject matter of the essay, and stating Macaulay's prediction concerning its influence.

9 Give, from the *Essay on Burns*, an account of Burns's winter in Edinburgh, stating its effect on his character.

10 Give, from the essay on *Compensation*, *two* illustrations showing that the law of compensation was recognized in ancient mythology.

11 Give the simile used by Matthew Arnold to describe the following, and explain the application:

> So Rustum knew not his own loss, but stood
> Over his dying son, and knew him not.

12 Describe Portia's plans for the relief of Antonio and sketch the steps taken in carrying them out.

13 Describe the circumstances under which the following was uttered and explain its meaning:

> And this our life, exempt from public haunt,
> Finds tongues in trees, books in the running brooks,
> Sermons in stones, and good in everything.

14 Give, from *The Virginians*, an account of George Warrington's sudden appearance in London and show how it affected the future life of his brother.

15 State the connection of *each* of the following with the literature studied in this course: Belmont, the house of Castlewood, Arden, Tunbridge Wells, Ludlow castle.

High School Department

166TH EXAMINATION

ENGLISH COMPOSITION

Tuesday, September 25, 1900 — 1.15 to 4.15 p. m., only

Answer questions 11-15 and five of the others but **no more.** *If more an five of the others are answered only the first five answers will considered. Each complete answer will receive 10 credits. Papers titled to 75 or more credits will be accepted.*

1 Write a paragraph of at least 75 words on the following pic: The necessity of labor.

2 Write a letter to a friend, describing the most interesting .y of your summer vacation.

3 Rewrite the following sentence in *three* other ways, stat- g, with reason, which form is preferable:

The church, which was a very old building of gray stone, ɔod near a village, about half a mile from the park gate.

4 Combine the following into a single, well expressed sen- nce: Suddenly there was seen the figure of a man. The an was ancient. He seemed to emerge from among the :ople. He was walking by himself. He walked along the nter of the street. He walked in order to confront the med band.

5 Write the following sentences in correct form: *a*) I do ɔt mean to say that I have learned nothing from the lecture :cause I have, *b*) He read the few volumes which constituted s father's library over and over, *c*) I was anxious for her to rive and that they should become friends, *d*) I can endure most anything in a young man than to see indifference toward s mother, *e*) The letter-carrier's duties are ones that can not : finished in a short time because they are out from morning ll night.

6 Contract each of the following sentences: *a*) Summer is e season of the year which is most delightful, *b*) It is expected at you will be here next week, *c*) Many can conquer their ger, but they can not conquer their pride, *d*) It would be ne satisfaction to us if we could know your reasons, *e*) When deer was grazing near the water's edge he heard the baying :he hounds.

7 Write a receipted bill for professional services rendered by you to Edward Seaman.

8 Describe the personal appearance of Rebecca as given in *Ivanhoe*, and mention *three* traits of her character.

9 Give an account of life in the 12th century as depicted in the opening chapters of *Ivanhoe*.

10 Describe Prince John's banquet in the castle of Ashby after the tournament.

11–15 Write an essay of at least 250 words on *one* of the following topics, paying particular attention to introduction and conclusion, sequence of thought, paragraph structure and sentence transition [Essays on subjects other than those assigned will not be accepted]: *a*) Labor day in the city, *b*) The woods in autumn.

High School Department

167TH EXAMINATION

ENGLISH COMPOSITION

Monday, January 21, 1901 — 1.15 to 4.15 p. m., only

Answer questions 11-15 and five of the others but **no more.** *If more in five of the others are answered only the first five answers will considered. Each complete answer will receive 10 credits. Papers itled to 75 or more credits will be accepted.*

1 Write a paragraph of at least 75 words on *one* of the folwing topics: *a*) The recognition of the Disinherited knight the tournament, *b*) The rewards of perseverance.

2 Write a letter of sympathy to a friend who has recently st her sister.

3 Combine the following into *a*) a loose sentence, *b*) a periodic ntence: It was a winter evening. We had finished our work. ne work had been very hard. We sat around the fire. We ld stories.

4 Write the following sentences in correct form: *a*) He ways read the magazines as soon as he received them with uch interest, *b*) He told him that he should go away, to go king everything that he possessed, but that he must go soon. There are boats and lawn tennis and no mosquitos to amuse e boarders, *d*, *e*) He is a child of the plains, who was raised ere, and familiar with the country previous to railways and hen it was known as a great desert.

5 Write an introductory paragraph for an essay on School iendships.

6 Contract or expand the following sentences, stating in deil the changes made: *a*) He is a man of great strength and is also a man of great courage, *b*) Though the weather is ld, yet it is not disagreeable, *c*) It will give us much pleasure we can be of assistance to you in any way, *d*) The day being iny, we did not go out, *e*) She regrets not having obeyed her ther.

7 Mention *three* ways in which variety of sentence structure ty be secured, illustrating each by rewriting the following itence: A beautiful house is on the top of the hill.

Write a letter to a business man in a distant city, introing a friend who is seeking employment.

9 Describe the scene of the storming of Front-de-Boeuf's castle as given in *Ivanhoe.*

10 Give an account of the experiences of Gurth when sent by his master to pay Isaac the Jew.

11–15 Write an essay of at least 250 words on *one* of the following topics, paying particular attention to introduction and conclusion, sequence of thought, paragraph structure and sentence transition [Essays on subjects other than those assigned will not be accepted]:

a) A Norman banquet [Let Waldemar Fitzurse describe the incidents of the feast given by Prince John at the conclusion of the sports at Ashby], *b*) A royal peacemaker [Give an account of the reconciliation of Cedric of Rotherwood and Wilfred of Ivanhoe].

NOTE—Students not familiar with *Ivanhoe* may write on *one* of the following: *a*) My last pleasure trip, *b*) The first snow-storm.

High School Department

168TH EXAMINATION

ENGLISH COMPOSITION

Wednesday, March 27, 1901 — 1.15 to 4.15 p. m., only

Answer questions 11-15 and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Write a paragraph of at least 75 words on *one* of the following topics: *a*) The contest in archery between Hubert and Locksley, *b*) The advantages of a good education.

2 Assume that you have just returned from a visit to a friend. Write her a letter appropriate to the occasion.

3 Write the following sentences in correct form: *a*) She lived alone in the house with small means and having too much pride to accept assistance, *b*) Interested in New York it is pleasant to see it prospering and growing, *c*) He told his brother that he had left his umbrella at his house, *d*) He who wishes to secure the position, let him call at the office tomorrow morning, *e*) In this manner we can get news from all parts of the world in a few hours that formerly took days.

4 Give an example of *a*) a loose sentence, *b*) a periodic sentence. State the advantage and the disadvantage of each.

5 Rewrite the following in simple English so as to express the idea as forcibly as possible:

The disastrous conflagration extended its devastating career with such rapidity that one edifice was entirely consumed before the progress of the devouring element could be arrested. One human being endowed with a large proportion of courage, was struck by timbers which, undermined by the fire, were driven from their proper position. The services of a physician were called into requisition. The man was too severely injured, however, for medical skill to prevail, and his spirit soon quitted its earthly habitation.

6 Distinguish in meaning between the sentences in *each* of the following pairs: *a*) I only saw him on the street yesterday; I saw him on the street only yesterday, *b*) Nobody shall prevent you from doing it; Nobody will prevent you from doing it, *c*) She gave me a blue and white dress; She gave me a blue and a white dress, *d*) He appeared prompt and willing; He appeared promptly and willingly, *e*) You may raise the window; You can raise the window.

7 Combine the following statements in *five* different ways, making such changes as are necessary for combining: This boy is a good student. He will easily pass the examinations.

8 Write a note to a publisher, ordering a copy of *Ivanhoe*. Make a statement concerning payment for the book.

9 Describe, as given in *Ivanhoe*, the escape of Isaac of York from Rotherwood.

10 Give an account of the interview between the Lady Rowena and Rebecca just before Rebecca's departure from England.

11–15 Write an essay of at least 250 words on *one* of the following topics, paying particular attention to introduction and conclusion, sequence of thought, paragraph structure and sentence transition [Essays on subjects other than those assigned will not be accepted]: *a*) The unknown champion [Let the Lady Rowena relate the experiences of the Disinherited knight in the tournament], *b*) The friar as host [Give an account of the visit of the Black knight to the hermit].

NOTE—Students not familiar with *Ivanhoe* may write on *one* of the following: *a*) The approach of spring, *b*) The president's inauguration.

High School Department

169TH EXAMINATION

ENGLISH COMPOSITION

Monday, June 17, 1901 — 1.15 to 4.15 p. m., only

Answer questions 11–15 and five of the others but **no more.** ***If more*** ***an five of the others are answered only the first five answers will*** ***considered. Each complete answer will receive 10 credits. Papers*** ***titled to 75 or more credits will be accepted.***

1 Write a paragraph of at least 75 words on *one* of the follow-g topics: *a*) Wamba's experience as a friar, *b*) The pleasures school life.

2 A friend has written you inquiring about *Ivanhoe.* Write letter, giving her a brief description of the book and telling er how you like it.

3 Write the following sentences in correct form: *a*) It was ı this house that he wrote the book in which he advocated the rinciples for which he suffered, and which is his most famous ook, *b*) It is sad that he could not have lived to have enjoyed ıis prosperity, *c*) My cousin died of typhoid fever and he was very fine man, *d*) He preferred a walk in the hot sun rather ıan to ride in a covered carriage, *e*) While sitting in my room ıst after lunch the fire alarm sounded.

4 Define periodic sentence, balanced sentence. Write an xample of each containing at least 20 words.

5 Express the idea of the following sentence in *five* other 'ays: There never was a time when the skilled workman was ɔ much in demand as he is now.

6 Contract the following sentences into simple sentences, :ating in detail the changes made: *a*) He is a man whose ıaracter is above reproach, *b*) Before he went away he paid is bill, *c*) She is a woman who is full of mirth, *d*) I seated ıyself in the shade, for I wished to enjoy the view, *e*) School as dismissed because the day was so hot.

7 Write *each* of the following sentences, using the correct ılicized word: *a*) The rose smells (*sweetly*, *sweet*), *b*) The ɔney is to be divided (*between*, *among*) the three brothers, She was greatly (*affected*, *effected*) by the news that she :eived this morning, *d*) He threw the book (*in*, *into*) the fire, He said that the Catskill mountains (*were*, *are*) in New York :e, *f*) This is the (*person*, *party*) to whom I referred, *g*) He

told the story to (*most*, *almost*) every one who called, *h*) He (*accepted*, *excepted*) with pleasure the invitation that she gave him, *i*) I have heard that she is (*some*, *somewhat*) better, *j*) The foot-ball and the tennis racket belong to my brother and sister (*respectfully*, *respectively*).

8 Write an advertisement offering a reward for the return of a pocket-book containing money, which you have lost.

9 Write a sketch of the first unhorsing of Brian de Bois-Guilbert by the Disinherited knight at the tournament.

10 Describe the scene in Sherwood forest in which Richard pardons Robin Hood and his men.

11–15 Write an essay of at least 250 words on *one* of the following topics, paying particular attention to introduction and conclusion, sequence of thought, paragraph structure and sentence transition [Essays on subjects other than those assigned will not be accepted]:

a) A search for shelter [Give an account of the experiences of Prior Aymer and the Templar in their effort to find Rotherwood], *b*) A day of anxiety [Let Rebecca describe her last day at Templestowe].

NOTE—Students not familiar with *Ivanhoe* may write on *one* of the following: *a*) An interesting dream, *b*) A June walk.

High School Department

167TH EXAMINATION

ADVANCED ENGLISH COMPOSITION

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered ıly the first 10 answers will be considered. Division of groups is ıt allowed. Each complete answer will receive 10 credits. Papers ıtitled to 75 or more credits will be accepted.*

1 Distinguish between impressional description and circum-antial description. State what is meant by point of view in escription and explain its importance.

2–3 Write at least 100 words, describing a house in such a ay as to convey the impression of loneliness.

4–5 Write at least 100 words, describing the personal appear-ıce, and the mental and moral characteristics of some one ɔu know.

6–8 Write a narrative based on the following details: a ıarrel on the street, an accident, a reconciliation.

9–10 Indicate a plan for a simple narrative by outlining a tuation presenting a difficulty, an incident and the result of ıe incident. [Do not use details given in questions 6–8.]

11–12 Write an abstract of the following article entitled *ournalism of New York:*

The making of a metropolitan daily is the fiercest, bitterest, ıost exhausting struggle in the world. Wall street has its urries and its periods of excitement which end in an explosion. 'hen comes rest. Park row, which is to the newspaper world 'hat Wall street is to finance, is always seething and bubbling, lways at white heat. Park row is running a neck and neck race 'ith time, and it may not even pause for breath. For time is ıe element which distinguishes news from other matters of ıterest, and Park row traffics in news. It is a great nerve enter, the collector and translator of intelligence. It is in ɔuch with the activities of the round world. To be more xact, there are many nerve centers, for each great newspaper ; a separate entity, and each makes a mighty effort to excel s rivals. This spirit exists wherever two or more newspapers re in the same field. In the metropolis the fighting is on a uge scale. Every department of the great machine plays a art in the struggle, which has neither beginning nor ending, ɔr there is not an hour in the 24 permitting the slightest elaxation. The newspaper that gets the best news, the latest ews, presents it most attractively, and places it first before ıe public, is the one that has the largest circulation, and rculation is the criterion by which the modern journal is easured. A big circulation means more advertising and gher rates, which, in turn, mean greater profits, and news-pers today are run to make money. But the very things ıt make them pay also increase their influence many-fold.

The first and principal business is the gathering of the news. One of the chief differences between the old journalism and the new lies in the fact that formerly newspaper editors contented themselves with what came to them; now they reach out after news. In offices like those of the *Sun*, *Herald*, *Journal*, *World* and *Times*, the day's work on the morning edition begins about nine o'clock in the morning, when the paper reader appears. It is his business to read carefully all the dailies published in New York. His concern is wholly with local matters and events bearing on them. He is supposed to go through the newspapers with a fine toothed comb, even to the advertisements, marking everything that promises to make a "story"—a generic term used to designate anything published in the news columns. He also marks the "beats," as exclusive stories are called. If one newspaper has printed a better story than the others, a story containing more facts or better written or illustrated, this also is marked, and a little table is made which will later make trouble for those responsible.

Then comes the assistant city editor, who also reads the newspapers carefully. He is looking for ideas. They are all looking for ideas, new, original and striking, that can be made into attractive news features. About this time the day news editor appears, and he reads the newspapers for telegraph and cable stories. The sporting editor reads the pages which concern his department.

All the men in executive places devote nearly half their time to reading newspapers. The wise reporters do the same. The big morning dailies have from 20 to 50 reporters. Formerly the reporters of the morning papers appeared at 11 o'clock in the morning. Now their work begins much later. The reason is that the evening editions cover the day so thoroughly that the morning editions are largely made up after six o'clock in the evening. The department men, the reporters who "do" the courts, the city hall, and other regular sources of news, go to work early, of course. All of the routine news is supposed to be gathered by the local bureau of the Associated press, which sends manifold copies to the different newspapers. This does not apply to the *Sun*, which conducts a local, national, and foreign news bureau of its own, supplying about 150 other newspapers throughout the country.

13 Write a letter to an aunt, announcing your intention of visiting her at a certain time. Give reasons for wishing to visit her at this time and ask if the visit will be convenient.

14 Write a letter to a friend, describing the most profitable book that you have read within the past year. State why you have found this book profitable

15 Write at least 75 words on *one* of the following topics: *a*) Use of description in narration, *b*) The observance of Sunday, *c*) Value of a good library.

High School Department

169TH EXAMINATION

ADVANCED ENGLISH COMPOSITION

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

***Answer eight questions but* no more.** *If more than eight are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

1 State somewhat in detail *two* distinct differences between descriptions of the front of a church as seen from a point of view directly across the way and as seen from a point of view 10 blocks away.

2–3 Write at least 100 words, describing *either* a city street *or* a country road in such a way as to convey the impression of heat.

4–5 Describe an elderly gentleman so that a stranger could recognize him when looking for him in a crowd.

6–8 Write a narrative suggested by the following: a robin, a nest, a lawn, a worm.

9–10 Summarize a short story with which you are familiar. [Use 40 minutes.]

11 Write an outline of the article given in questions 12–13.

12–13 Write an abstract of the following article, containing about 225 words and not more than *four* well constructed paragraphs:

Nothing is harder for this generation to understand than the change in the condition of man wrought in the last hundred years. The average American mechanic of today is in many respects better circumstanced than was any king of a century ago. He eats more wholesome food, and has more conveniences and devices for his comfort and satisfaction in living.

The century has seen human power immeasurably increased. It has seen the steam engine developed from a cumbrous and impracticable thing, little more than a toy, to a vast and perfect mechanism, sometimes with the power of more than a hundred thousand horses, controllable to the will of man. On the farm there has been the evolution of machinery capable of performing in a day work that had taken weeks. The old scythe, with a cradle attachment to lay the grain in furrows, has been succeeded by a machine to cut grain, to cut it and sweep it into bundles, and, finally, to cut it and tie it into sheaves. The old time sower, who went forth with a sack of seed to scatter over the land, has given place to machines that sow and plant faster and better than ten men.

Some aspects of the social problem, a hundred years ago, must have seemed appalling, if any one had cared to think of them. Workingmen suffered in-

justice the world over. The sword hung over them ever to keep them at work and quiet. Laws were still in force in some countries to limit the amount of wages they might receive, and to prevent them from bettering their condition by seeking other fields. Education for the children of workingmen was strenuously opposed, on the ground that it would make them discontented with the lot in which they were born.

Intellectual darkness brooded over all lands. It is hard now to escape an education; it was many times harder then to acquire one. Free public schools existed only in America, and were almost rudimentary. Everywhere knowledge was dear and hard to come by, everywhere books were scarce and periodicals few; and only the rich could secure for their children more than the outlines of education. Masses of people lived and died and knew nothing of the world about them, the deeds and thoughts and aspirations of other men, the things that redeem human life from the life of the beasts. Newspapers were exceedingly few, and were rather curiosities, strange illustrations of the ingenuity and invention of mankind, than disseminators of intelligence.

The learned professions, too, groped in a twilight. Medical science could hardly be called in its infancy, it was just beginning to exist. Men died of ailments that had not even names. Appendicitis and malaria prevailed then as now, but no one knew what caused them or how to combat them. There was no efficient system of quarantine, nor even of hospitals. If an epidemic started anywhere in the world, it traveled till it wore itself out, and in all seaports typhus fever, that now almost forgotten disease, raged without control.

Ease of communication among men may be thought a fair test of their advance in material civilization. A hundred years ago the world's methods of sending written messages showed little advance over the methods used in the Roman empire. Mail matter was forwarded about the world by sailing vessels and freight carriers, the charges, usually high, being collected at the end of the route. The slowness of communication must have produced business conditions that we, in this day, can scarcely conceive. Today, a New York house can communicate with its London correspondent, and get an answer, in seven minutes. A hundred years ago, a man in New York, writing to London, might get an answer in three months, if conditions were favorable; or he might not get one in half a year.

The 19th century was, beyond comparison, the most notable period in the history of the European races, marked by greater material progress than in all their previous available records. Whether the essential spirit of mankind, behind external conditions, makes progress even paced with improved environments, is a different question.

14 Write a note of apology for having failed to keep an appointment with a friend. Explain why you did not keep the appointment and arrange for another meeting.

15 A stranger visits the place in which you live. Let him write a letter to a friend, describing his impressions of the place.

High School Department

166TH EXAMINATION

RHETORIC

Tuesday, September 25, 1900—9.15 a. m. to 12.15 p. m., only

Answer questions 12–15 and six of the others but **no more.** *If more than six of the others are answered only the first six answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Develop the following topic sentence into a paragraph of at least 75 words: The conquest of difficulties is necessary to success.

2 In the following paragraph state the topic sentence and show the relation of each of the remaining sentences to the topic sentence:

To be intellectually self-possessed is essential to the exercise of power upon others. No man can exercise power who does not strongly hold in hand and skilfully use the instruments of power. No man can win an intellectual kingdom outside of himself who has not the command of his own forces. I know of few grander objects in the world than he who becomes the master of a supreme occasion through perfect self-possession.

3 Give and explain *three* functions of the introduction to the essay.

4 Mention the fault in *each* of the following sentences and correct each sentence: *a*) Near him sat his secretary who was writing letters to send by the ship which was to sail in a few days, *b*) He told me the story briefly and in a few words, *c*) He asked me while I was in the city to do an errand for him, *d*) Ambition is a plant that is nourished by obstacles, *e*) Clouds of fierce conflict are pouring over the country.

5 Rewrite the following in two or more sentences, paying special attention to clearness of style and unity of construction:

In that neighborhood while passing through the streets it could be seen that something had happened, and people were running on all sides, and one man was knocked down in the crowd and another man tried to help him but he was badly hurt, and they had to call an ambulance.

6 Give an example of *each* of the following: metonymy, apostrophe, loose sentence, periodic sentence.

7 Mention the figure of speech found in the following and trace in detail the points of comparison:

The shadows of the mind are like those of the body. In the morning of life, they all lie behind us; at noon, we trample them under foot; and in the evening, they stretch long, broad, and deepening before us.

8 Write the scansion of the following lines and give the prevailing foot and meter of each selection:

a And they whose meadows it murmurs through,
Have named the stream from its own fair hue.

b Leave us not — leave us not;
Can thy heart roam?
Wilt thou not pine to hear
Voices from home?

c The day had been sullen; but, towards his decline,
The sun sent a stream of wild light up the pine.
Darkly denting the red light revealed at its back
The old ruined abbey rose roofless and black.

9 Contrast the effect of the black veil on the minister with its effect on the people.

10 Give an account of the departure of Sir William Howe from the Province house.

11 Sketch the tale of *David Swan*, bringing out the lesson it teaches.

12–15 Write an essay of at least 250 words on *one* of the following topics [Essays on subjects other than those assigned will not be accepted]: *a*) A successful man, *b*) Recent political disturbances in China.

High School Department

167TH EXAMINATION

RHETORIC

Tuesday, January 22, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 12–15 and six of the others but **no more.** *If more than six of the others are answered only the first six answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Develop the following into a descriptive paragraph containing at least 75 words: It was a cold December day. The air was keen and piercing. The snow fell in drifting waves.

2 In the following paragraph state the topic sentence and show how the thought contained in the topic sentence is developed in each of the other sentences:

One is tempted to say that the most human plants, after all, are the weeds. How they cling to man and follow him around the world, and spring up wherever he sets his foot! How they crowd around his barns and dwellings, and throng his garden and jostle and override one another in their strife to be near him! Some of them are so domestic and familiar, and so harmless withal, that one comes to regard them with positive affection. Motherwort, catnip, plantain, tansy, wild mustard,—what a homely human look they have! they are an integral part of every old homestead.

3 State the rhetorical defect in *each* of the following sentences and correct each sentence: *a*) The woods completely surrounded us on all sides, *b*) My cousin who is acquainted with the man who came here yesterday says the story is true, *c*) She is associated with, and also related to, my sister, *d*) Miss Brown has been very ill this week and she is visiting my sister, *e*) She told her sister that she knew she had walked far enough.

4 Complete the similes begun in the following, showing the points of comparison:

a) She is as firm , *b*) Her voice is like , *c*) Her eyes sparkle .

5 Rewrite the following in two or more sentences, paying special attention to clearness of style and unity of construction:

After hurriedly eating my supper a friend came in and she wanted me to go out with her and my mother asked me, when I went out, to do an errand for her, which I did, and I did not get home till dark (it was nearly eight o'clock), and I was not tired even then; at least I did not feel tired.

6 Give an example of *each* of the following: metaphor, metonymy, apostrophe, antithesis.

7 Write the scansion of the following lines and give the prevailing foot and meter of each selection:

a Life's fairest things are those which seem,
The best is that of which we dream.

b Labor with what zeal we will,
Something still remains undone,
Something uncompleted still
Waits the rising of the sun.

c Then she remembered the tale she had heard of the justice of heaven;
Soothed was her troubled soul, and she peacefully slumbered till morning.

8 Give the story of "Lady Eleanore's mantle."

9 Give an account of old Esther Dudley's loyalty to the king.

10 Show how suspense and mystery are brought out in "Mr. Higginbotham's catastrophe."

11 Prepare an outline for an essay on *one* of the following, making sufficient subdivisions to show what matter you intend to include in the essay: *a*) "Sights from a steeple," *b*) Patriotism.

12–15 Write an essay of at least 250 words on *one* of the following topics [Essays on subjects other than those assigned will not be accepted]: *a*) When the canvas speaks [Let one of Elinor's friends write the story of the prophetic pictures], *b*) Lost opportunities [Describe the opportunities that David Swan missed while sleeping].

NOTE—Students not familiar with *Twice-told tales* may substitute *one* of the following: *a*) Labor strikes, *b*) Uses of steam.

High School Department

168TH EXAMINATION

RHETORIC

Thursday, March 28, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 12–15 and six of the others but **no more.** *If more than six of the others are answered only the first six answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Develop the following topic sentence into a paragraph of at least 75 words, by presenting contrasting ideas: The possession of great wealth does not always bring happiness.

2 In the following paragraph give *a*) the topic sentence, *b*) the relation of the second sentence to the topic sentence, *c*, *d*) the bearing of sentences three and six on the main thought of the paragraph, *e*) an example of parallel construction:

There is a good deal of curiosity among literary men in regard to the habits of one another. Men who find their work hard, their health poor, and their production slow, are always curious concerning the habits of those who accomplish a great deal with apparent ease. Some men do all their writing in the morning. Some of them even rise before their households, and do half their day's work before breakfast. Others do not feel like going to work until after breakfast and after exercise in the open air. Some fancy that they can work only in the evening, and some of these must wait for their best hours until all but themselves are asleep.

3 Correct the following sentences: *a*, *b*) Our new home surpasses the old very much, specially the large lawn which we have in front, which is being decorated with flowers which are in bloom at present, *c*) The committee who was appointed to investigate the matter says that he kept his word literally and to the letter, *d*) He flung his powerful frame into the saddle and his great soul into the cause, *e*) The apple of discord is in our midst, and if not nipped in the bud it will deluge us with trouble.

4 Mention the figure of speech in *each* of the following sentences and rewrite each sentence, expressing the thought without using figurative language: *a*) In the midst of the clouds of sorrow appeared the rainbow of promise, *b*) He read Longfellow when he was nine years old, *c*) The breeze whispered in her ear a message of hope, *d*) His mind was a storehouse in which were hidden rich treasures of thought, *e*) The words fell from her lips as softly as leaves fall from a tree.

5 Define *five* of the following: colloquialism, verbosity, balanced sentence, florid style, rhythm, cesura, run-on lines.

6 Mention *three* ways in which unity is violated in the following sentence, and rewrite the sentence in correct form, using two or more sentences if necessary:

My uncle who is an old man (indeed I think he is nearly 90 years old) asked my brother who was studying his lesson which was very difficult, to go to the store for him, and he refused and we all thought he was very disagreeable, only my mother said he did not feel well and the snow was deep and it was cold and he did not want to go out; at least she hoped that was the reason.

7 Explain what is meant by transition within the paragraph. Write a paragraph containing *two* examples of transition and show the force of each.

8 Write the scansion of the following lines and give the prevailing foot and meter of each selection:

a Ah, distinctly I remember it was in the bleak December,
And each separate dying ember wrought its ghost upon the floor.

b When can their glory fade?
O the wild charge they made!
All the world wonder'd.

c I marvel how Nature could ever find space
For so many strange contrasts in one human face.

9 Describe the scene at the tavern in Parker's Falls when the report of Mr Higginbotham's murder was contradicted.

10 Snow in detail how the prophecy of the prophetic pictures was fulfilled in the lives of Elinor and Walter.

11 Give an account of the connection of Jervase Helwyse with the story of "Lady Eleanore's mantle". State the lesson brought out in this tale.

12–15 Write an essay of at least 250 words on *one* of the following topics [Essays on subjects other than those assigned will not be accepted]:

a) A mysterious vow [Let Elizabeth tell the story of the minister's black veil], *b*) The passing throng [Describe the appearance of a city as viewed in "Sights from a steeple"].

NOTE—Students not familiar with *Twice-told tales* may substitute *one* of the following: *a*) Victoria as queen, *b*) A moonlight scene.

High School Department

169TH EXAMINATION

RHETORIC

Tuesday, June 18, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 12–15 and six of the others but **no more.** *If more* *an six of the others are answered only the first six answers will be* *nsidered. Each complete answer will receive 10 credits. Papers enti-* *ed to 75 or more credits will be accepted.*

1 Develop the following topic into a paragraph of about 75 ords, containing at least *one* sentence referring to the dreamer, *e* to the worker, and *one* to both: The dreamer and the orker.

2 In the following paragraph point out *a*) the topic sentence, the words in the first sentence on which the third sentence epends, *c*) the relation of the fifth sentence to the third sen- nce, *d*) an illustration of antithesis, *e*) a periodic sentence:

A boy needs both physical and moral courage. Neither can take the place the other. When boys become men they will find out that there are some ldiers very brave in the field who have proved timid and worthless as poli- cians, and some politicians who show an entire readiness to take chances id assume responsibilities in civil affairs, but who lack the fighting edge hen opposed to physical danger. In each case, with soldiers and politicians ike, there is but half a virtue. The possession of the courage of the soldier es not excuse the lack of courage in the statesman, and even less does the ssession of the courage of the statesman excuse shrinking on the field battle.

3 Correct the following sentences: *a*) This is to certify that attended Mis Smith in her last illness which was caused by a ll on the ice by which she was seriously injured and that she ied in consequence thereof, *b*) When I opened the package I und only an empty box with nothing in it that had been sent y mistake, *c*) Knowing that she was as old if not older than er sister, a book was selected for her, *d*) Flowers of pleasure loomed all along her pathway, illuminating her life with adness, *e*) The building was surrounded by a mob armed ith rustic weapons and ungovernable fury.

4 Mention and explain *three* ways in which the topic sentence a paragraph may be developed.

5 Distinguish between *a*) balanced sentence and parallel istruction, *b*) unity and continuity (sequence of thought) paragraph structure.

6 State the figure of speech in *each* of the following and show the points of comparison:

a Words are like leaves; and, where they most abound,
Much fruit of sense beneath is rarely found.

b Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time.

c How far that little candle throws his beams!
So shines a good deed in a naughty world.

7 Rewrite the following in two or more sentences, paying special attention to clearness of style and unity of construction:

At five o'clock in the afternoon of a cold December day, while walking through the village a light appeared in a far distant house which I found on drawing nearer was the light of an old, unoccupied dwelling which had not for some time been inhabited, being in very bad condition, and so I was very curious to know where it came from and I walked till I came to the house and then only found that it was a reflection from some light in the street.

8 Write the scansion of the following lines and give the prevailing foot and meter of each selection:

a Clouds that love through air to hasten,
Ere the storm its fury stills,
Helmet-like themselves will fasten
On the heads of towering hills.

b Widow and Saxon maid
Long shall lament our raid,
Think of Clan-Alpine with fear and with woe.

c God made all the creatures and gave them our love and our fear,
To give sign, we and they are his children, one family here.

9 Describe the life of old Esther Dudley in the Province house.

10 Show how wealth, love and death approached David Swan.

11 Sketch the story of the "Minister's black veil", bringing out the lesson taught.

12–15 Write an essay of at least 250 words on *one* of the following topics [Essays on subjects other than those assigned will not be accepted]:

a) The red flag of pestilence [Give an account of the spread of the smallpox epidemic in Boston by means of Lady Eleanore's mantle], *b*) An aristocratic gathering [Let Miss Joliffe describe the march of the spectral governors and its effect on the people present at Howe's masquerade].

NOTE—Students not familiar with *Twice-told tales* may substitute *one* of the following: *a*) The Pan-American exposition, *b*) Among my flowers.

High School Department

167TH EXAMINATION

HISTORY OF LITERATURE

Friday, January 25, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more**; *of these 10 questions at least five ıst be from part 1 in order to receive credit for English literature, d five from part 2 in order to receive credit for American literature. ch complete answer will receive 10 credits. Papers entitled to 75 or re credits will be accepted.*

1 Give the author and the plan of the *Canterbury tales.* Mention *two* contemporary writers, giving a work of each.

2 Mention *three* authors between Chaucer and Shakspere, ving the title of a work of each.

3 Mention the play of Shakspere in which *one* of the folwing characters appears and show the part played by this aracter in the development of the plot: Portia, Ophelia, osalind, Cordelia.

4 Write a sketch of *one* of the following works: *Utopia, erie queene, Pilgrim's progress.*

5 Mention *two* works by Richardson or Fielding or Smollett. ve a brief description of *one* of the works mentioned.

6 Mention prominent authors of the 17th or 18th century as llows: *two* satirists who were also poets, *two* satirists who ere also essayists, *one* philosopher. Give the title of a work each.

7 State what is meant by the Lake school of poetry. Menon *two* poets belonging to this school and *two* poems of each.

8 Write on *one* of the following topics: *a*) literature from e Norman conquest to Chaucer, *b*) historical writers of the th century.

9 Show how the rising spirit of the times influenced the lection and the working out of the plot of a novel by an ithor of the 19th century.

10 Select 10 of the following authors and mention *one* work each: Butler, Milton, Goldsmith, Byron, Shelley, Robert owning, Macaulay, George Eliot, Carlyle, Stevenson, Scott, rnold, Thackeray, Tennyson, Bacon.

11 Write on *one* of the following topics: *a*) education in colonial times, *b*) orators and statesmen in the revolutionr period.

12 Mention the class of works for which *each* of the following is specially noted and give the title of a work of each: Cotton Mather, Charles Dudley Warner, John Lothrop Motley, Benjamin Franklin, Ralph Waldo Emerson.

13 Give a sketch of the life and literary work of Longfellow.

14 Mention *two* works by *each* of the following: John Burroughs, Oliver Wendell Holmes, Thoreau, Irving, Lew Wallace.

15 Show the influence of the times on the writings of Harriet Beecher Stowe. Mention *three* contemporary writers and the title of a work of each.

16 Write a sketch of a work of *one* of the following: Donald G. Mitchell, Bryant, Lowell.

17 Mention *three* writers of short stories and the name of a short story by each. Give a sketch of *one* of the stories mentioned.

18 Give an account of *two* of the following authors: Parkman, Bryant, Webster, Lincoln.

19 Sketch a leading character in *one* of the following: *a*) *Lars*, *b*) *Last of the Mohicans*, *c*) *House of the seven gables.*

20 Select 10 of the following works and mention the author of each: *Poor Richard's almanac*, *The bells*, *Marco Bozzaris*, *Snow-bound*, *Potiphar papers*, *Hannah Thurston*, *Conquest of Peru*, *Two years before the mast*, *Hoosier schoolmaster*, *A woman's reason*, *Choir invisible*, *Prophet of the Great Smoky mountain*, *Honorable Peter Stirling*, *Soldiers of fortune*, *Old-fashioned girl.*

High School Department

169TH EXAMINATION

HISTORY OF LITERATURE

Friday, June 21, 1901—1.15 to 4.15 p. m., only

Answer 10 questions but **no more**; *of these 10 questions at least five must be from part 1 in order to receive credit for English literature, and at least five from part 2 in order to receive credit for American literature. Answer 10 questions in all cases, whether credit is desired for either one of the two parts or for both parts. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

English Literature

Part 1

1 State the influence of the Norman conquest on English literature. Show how one may become familiar with Norman manners and customs through modern literature.

2 Write on *one* of the following topics: *a*) old English prose, *b*) poetry of the 18th century, *c*) historians of the 19th century.

3 Give an account of Shakspere, touching on *a*) his work as a dramatist, *b*) his work as a poet, *c*) his influence on English literature.

4 "In De Foe we must acknowledge the real father of British fiction."

Explain the above statement. Mention *two* prominent novelists contemporary with De Foe or immediately following him.

5 Give the author and the plan of the *Sir Roger de Coverley papers*. Characterize briefly the style of the author.

6 Mention the class of works for which *each* of the following is specially noted and give the title of a work of each: Milton, Dryden, Samuel Johnson, Goldsmith, George Eliot.

7 Mention, with a work of each, authors of the 19th century as follows: *a*) *three* essayists, *b*) *two* philosophers.

8 Compare the poetry of Coleridge with that of Wordsworth, mentioning the points of similarity and of difference.

9 Write a sketch of a leading character in one of Thackeray's novels.

10 Select 10 of the following works and mention the author of each work selected: *David Copperfield*, *Princess*, *Ivanhoe*, *Essay on man*, *Pilgrim's progress*, *Decline and fall of the Roman empire*, *Last days of Pompeii*, *Cotter's Saturday night*, *Faerie queene*, *Treasure island*, *Plain tales from the hills*, *Childe Harold*, *Blessed damozel*, *Lost leader*.

American Literature

Part 2 11 Describe the literature of colonial times and show how it was affected by the life of the colonists.

12 Give a sketch of the life and works of Washington Irving.

13 Give an account of the Brook farm experiment and explain its influence on literature.

14 Show how the character and life of *one* of the following writers are reflected in his works: Poe, Lowell, Whittier.

15 Mention *two* humorists, *two* writers of dialect stories, *one* translator. Give the title of a work of each.

16 State some interesting facts concerning *two* of the following authors: John Burroughs, James Fenimore Cooper, Daniel Webster.

17 Write a sketch of a work of *one* of the following: Holmes, Aldrich, Louisa M. Alcott.

18 Give an outline of a story from Hawthorne's *Twice told tales*.

19 Sketch a leading character in *one* of the following: *Snow-bound*, *Courtship of Miles Standish*, *Reveries of a bachelor*.

20 Select 10 of the following authors and mention a work of each author selected: Harriet Beecher Stowe, Prescott, Bryant, Charles Dudley Warner, Howells, Parkman, George William Curtis, Holland, Whitman, Stockton, Saxe, Trowbridge, Lanier, Emerson, Helen Hunt Jackson.

High School Department

167TH EXAMINATION

COURSE IN ENGLISH READING

Friday, January 25, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *At least five questions must be chosen from the second division. Each answer under the first division will be considered a short (15 minute) theme and will be graded for composition. If more than 10 questions are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

st ision 1 Describe the circumstances under which the story of the *Princess* was told.

2 Write the story of Bassanio, as given in *Merchant of Venice.*

3 Give an account of the circumstances that led Silas Marner to leave Lantern Yard.

4 Let Sir Roger give an account of his visit to the theater.

5 Describe the interview between Glaucus and Diomed, as given in the *Iliad.*

6 Give, from the *Vicar of Wakefield*, an account of the visit of Moses Primrose to the fair.

7 Describe Cedric's escape from Torquilstone, as given in *Ivanhoe.*

8 Give, from the *Last of the Mohicans*, an account of the night spent in the cavern at Glenn's.

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cond ision 9 Discuss Burke's objections to the use of force as given in *Conciliation with America.*

10 Explain the italicized words in the following from *Macbeth:*

a The merciless Macdonwald . . .
from the western isles
Of *kerns* and *gallowglasses* is supplied.

b So please you, it is true: our *thane* is coming.

c The innocent sleep,
Sleep that knits up the *ravell'd sleave* of care.

d Approach thou like the rugged Russian bear,
The arm'd rhinoceros, or the *Hyrcan* tiger.

11 Discuss the question as to whether Lady Macbeth's swoon on hearing of the murder of the grooms is real or feigned. Justify your position.

12 Contrast the evening described in *L'allegro* with that lescribed in *Il penseroso.*

13 Write explanatory notes on the italicized expressions in the following from *L'allegro*, *Il penseroso* and *Comus:*

a Nods and becks and wreathèd smiles,
Such as hang on Hebe's cheek.

b There let *Hymen oft appear.*

c Hovering dreams,
The *fickle pensioners of Morpheus' train.*

d While yet there was *no fear of Jove.*

e But first I must put off
These my sky robes, *spun out of Iris' woof.*

14 Discussing Milton's conduct during the administration of the Protector, Macaulay says, "That an enthusiastic votary of liberty should accept office under a military usurper seems, no doubt, at first sight, extraordinary. But all the circumstances in which the country was then placed were extraordinary." Give an account of the circumstances to which Macaulay refers.

15 Give, from Macaulay's *Essay on Addison*, the characteristics of the mirth of Addison as distinguished from those of the mirth of Swift or of Voltaire.

High School Department

169TH EXAMINATION

COURSE IN ENGLISH READING

Friday, June 21, 1901 — 1.15 to 4.15 p. m., only

Answer eight questions but no more. *At least four questions must be chosen from the second division. Each answer under the first division will be considered a short (20 minute) theme and will be graded for composition. If more than eight questions are answered only the first eight answers will be considered. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division 1 Give, from the *Merchant of Venice*, the story of the caskets.

2 Relate, from *Silas Marner*, the adventures of Dunstan Cass on the day of the hunt.

3 Give a description of the domestic life of Sir Roger de Coverley

4 Explain why the curse was imposed on the ancient mariner and show how it was removed.

5 Give, from the *Iliad*, an account of the circumstances leading to the quarrel between Achilles and Agamemnon.

6 Describe, from the *Vicar of Wakefield*, the scene which concluded the troubles of the Primrose family.

7 Sketch the character of Robin Hood as given in *Ivanhoe*.

8 Give, from the *Last of the Mohicans*, an account of the canoe chase along the Horicon.

Second division 9 Give the successive arguments by which Burke reaches the conclusion that compliance with the American spirit is a necessity.

10 State by whom and under what circumstances *two* of the following were uttered, and explain the meaning of each quotation selected (*Macbeth*):

a Till that Bellona's bridegroom, lapp'd in proof,
Confronted him with self-comparisons.

b There's no art
To find the mind's construction in the face.

c Rather than so, come fate into the list,
And champion me to the utterance!

d Now we'll together; and the chance of goodness
Be like our warranted quarrel!

e They have tied me to a stake; I can not fly,
But, bear-like, I must fight the course.

11 Did the murder of Duncan originate with Macbeth or with Lady Macbeth? Justify your answer by references to the play.

12 Explain the italicized words in the following from *L'allegro* and *Il penseroso:*

a But come, thou goddess fair and free,
In heaven *yclep'd Euphrosyne.*

b Where perhaps some beauty lies,
The *cynosure* of neighbouring eyes.

c Where I may oft outwatch the bear,
With thrice-great *Hermes.*

d And storied windows richly *dight,*
Casting a dim religious light.

13 Explain the allusions in the following from *Comus:*

I have oft heard
My mother Circe with the sirens three,
Amidst the flow'ry-kirtled naiades,
Culling their potent herbs, and baleful drugs,
Who, as they sung, would take the prison'd soul,
And lap it in Elysium; Scylla wept,
And chid her barking waves into attention,
And fell Charybdis murmur'd soft applause.

14 "We think that, as civilization advances, poetry almost necessarily declines."

Give in detail, from the *Essay on Milton*, *two* of Macaulay's arguments to sustain the above statement.

15 Give Macaulay's explanation of the fact that Addison succeeded as a politician though he failed as a public speaker.

University of the State of New York

High School Department

166TH EXAMINATION

ENGLISH SELECTIONS

Wednesday, September 26, 1900 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Select from the *Prologue* five different characters, *one* representing chivalry, *two* representing the learned professions, *two* representing the middle classes. Describe *one* of the characters selected.

2 Show the connection of *each* of the following with the story of the *Tempest:* Antonio, Prospero, Ferdinand, Miranda, Gonzalo.

3 State by whom and under what circumstances the following words were spoken, and explain the meaning of the italicized expression:

> For several virtues
> Have I lik'd several women, never any
> With so full soul but some defect in her
> Did quarrel with the noblest grace she owed,
> *And put it to the foil;* but you, O you,
> So perfect and so peerless, are created
> Of every creature's best!

4 State *three* of the subjects concerning which Timotheus sang, as given in *Alexander's feast*, and describe the effect on Alexander of each song mentioned.

5 Give a brief sketch of the life of Wordsworth, showing the influence of his environment on his poetry.

6 Show, by quotations or by paraphrases from *Lines composed above Tintern Abbey*, Wordsworth's attitude toward nature.

7 Show how the theme of *Laodamia* is expressed in the following quotation:

> Learn, by a mortal yearning, to ascend —
> Seeking a higher object. Love was given,
> Encouraged, sanctioned, chiefly for that end;
> For this the passion to excess was driven —
> That self might be annulled: her bondage prove
> The fetters of a dream, opposed to love. —

8 Give, from the *Coming of Arthur*, the story told by Bleys, Merlin's master, in reference to Arthur's birth.

9 Give the history of the holy grail before it was caught away to heaven, and mention *three* people who afterward saw the grail.

10 Describe the hall built for Arthur by Merlin.

11 Explain the meaning of the following quotations, mentioning the work from which *each* is taken:

> *a* Some books are to be tasted, others to be swallowed, and some few to be chewed and digested
>
> *b* Truth may perhaps come to the price of a pearl, that showeth best by day; but it will not rise to the price of a diamond or carbuncle, that showeth best in varied lights.

12 Burke cites Ireland, Wales, Chester and Durham as precedents for conciliation. Give a sketch of what he says in regard to either Ireland or Wales.

13 State *five* divisions under which Carlyle classifies heroes and give the name of *one* hero mentioned by him under each division.

14 Sketch Bacon's political career up to the time of the reign of James 1.

15 Write *two* quotations of at least *five* consecutive lines each from one or more of the following: *Alexander's feast*, the *Coming of Arthur*, *Heroes and hero worship*.

High School Department

167TH EXAMINATION

ENGLISH SELECTIONS

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Give, from the *Prologue*, a description of *three* of the following: knight, squyer, prioresse, monk, frere, wyf of Bathe.

2 Describe the first meeting between Ferdinand and Miranda as portrayed in the *Tempest*.

3 Describe the circumstances under which the following was uttered:

Though with their high wrongs I am struck to the quick,
Yet with my nobler reason 'gainst my fury
Do I take part: the rarer action is
In virtue than in vengeance: they being penitent,
The sole drift of my purpose doth extend
Not a frown further.

4 Show, by references to style and subject matter, how Dryden, in *A song for St Cecilia's day*, describes the music of the trumpet, the flute, the violin and the organ.

5 Write the story of *Laodamia*.

6 Describe the change to which Wordsworth refers in the following quotation from *Lines composed above Tintern abbey:*

And so I dare to hope,
Though changed, no doubt, from what I was when first
I came among these hills.

7 Mention *two* incidents that occurred in the life of the prisoner of Chillon after the death of his brothers and show how each affected his feelings.

8 Sketch, from the *Coming of Arthur*, the song of Arthur's knighthood. State the purpose of the organization of the round table.

9 Describe the scene in which the knights take the vow to search for the holy grail, and give Arthur's views concerning this vow.

10 Narrate the events on which *each* of the following poems is based: *Hervé Riel*, *Pheidippides*.

11 Mention the six main resolutions proposed by Burke in connection with conciliation.

12 Give an account of what Bacon says concerning the things to be observed and the acquaintances to be made while traveling.

13 Write on *one* of the following topics from *Heroes and hero worship:* *a*) Norse mythology, *b*) life and customs of the Arabs, *c*) life of Dante.

14 Describe Bacon's preparation for literary work, touching on *a*) parentage, *b*) education, *c*) environment.

15 Mention the poem from which *one* of the following quotations is taken and explain the references in the quotation selected:

a Calme was the day, and through the trembling ayre
Sweete-breathing Zephyrus did softly play,
A gentle spirit, that lightly did delay
Hot Titans beames, which then did glyster fayre.

b In one voyage
Did Claribel her husband find at Tunis;
And Ferdinand, her brother, found a wife
Where he himself was lost; Prospero his dukedom
In a poor isle.

c Ah, wherefore?—Did not Hercules by force
Wrest from the guardian monster of the tomb
Alcestis, a reanimated corse,
Given back to dwell on earth in vernal bloom?
Medea's spells dispersed the weight of years,
And Aeson stood a youth 'mid youthful peers.

High School Department

169TH EXAMINATION

ENGLISH SELECTIONS

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Contrast the characters of the prioresse and the wyf of Bathe as described in the *Prologue*.

2 Explain the meaning of the following from the *Prothalamion:*

> Yet therein now doth lodge a nobler peer,
> Great Englands glory, and the worlds wide wonder,
> Whose dreadfull name late through all Spaine did thunder,
> And Hercules two pillors standing neere
> Did make to quake and feare.

3 Give, from the *Tempest*, Ariel's account of the wreck and the dispersion of the people.

4 Give an outline of the *Song for Saint Cecilia's day.*

5 State the theme of *Laodamia*, illustrating by references to the poem.

6 Show in detail what Wordsworth means by *beauteous forms* in the following quotation from *Lines composed above Tintern abbey:*

> These *beauteous forms*,
> Through a long absence, have not been to me
> As is a landscape to a blind man's eye:
> But oft, in lonely rooms, and 'mid the din
> Of towns and cities, I have owed to them
> In hours of weariness, sensations sweet.

7 Describe, from the *Prisoner of Chillon*, the view seen by the eldest brother from his dungeon window.

8 Describe, from the *Coming of Arthur*, the scene in which Arthur first saw Guinevere, and give an account of their wedding.

9 Sketch the story of Theocrite as given in *The boy and the angel.*

10 Mention ***three*** uses of studies given by Bacon in his *Essay on studies* and state what he says in regard to each.

11 Give, from *Heroes and hero worship*, a sketch of the life of *one* of the following: Mahomet, Dante, Luther.

12 Give, from Macaulay's *Essay on Bacon*, an account of the downfall of Bacon.

13 Explain, with special reference to the italicized expressions, the meaning of the following quotation from *Conciliation with the colonies:*

> First, the house, in accepting *the resolution moved by the noble lord*, has admitted, notwithstanding the menacing front of *our address*, notwithstanding our heavy bills of pains and penalties — that we do not think ourselves precluded from all ideas of free grace and bounty.

14 Give a sketch of the life of Burke, referring specially to his political party affiliations.

15 Mention the work from which each of *two* of the following quotations is taken and show how each quotation selected is connected with the context:

a I might call him
A thing divine, for nothing natural
I ever saw so noble.

b With downcast looks the joyless victor sate,
Revolving in his alter'd soul
The various turns of chance below;
And, now and then, a sigh he stole;
And tears began to flow.

c Go, since your vows are sacred, being made:
Yet—for ye know the cries of all my realm
Pass thro' this hall—how often, O my knights,
Your places being vacant at my side,
This chance of noble deeds will come and go
Unchallenged, while ye follow wandering fires
Lost in the quagmire!

d Into their midst I broke: breath served but for "Persia has come!
Persia bids Athens proffer slaves'-tribute, water and earth."

High School Department

166TH EXAMINATION

AMERICAN SELECTIONS

Tuesday, September 25, 1900—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Sketch the part taken by Major Heyward in connection with the surrender of Fort William Henry.

2 Describe the house of the seven gables and relate the circumstances under which it was built.

3 Describe the flight of Hepzibah and Clifford, giving an account of their railway journey.

4 Give, by quotation or otherwise, Bryant's explanation of the italicized words in the following from *Thanatopsis:*

> Yet not to thine eternal resting-place
> Shalt thou retire *alone*, nor couldst thou wish
> Couch more *magnificent.*

5 Give, from *My garden acquaintance*, Lowell's account of the robin.

6 Give, from *A glance behind the curtain*, Lowell's description of Cromwell and Hampden as they stood on the pier.

7 State the circumstances that led Longfellow to write the *Hanging of the crane*, and describe the plan of the poem.

8 Trace the development of the character of Lars as given by Taylor.

9 Give the substance of the sketch in *Reveries of a bachelor* on *either* "School-days" *or* "School revisited."

10 Give the history of the Alhambra up to the time of the departure of the French.

11 Give, from the *Alhambra*, a sketch of the legend of the "Three beautiful princesses."

12 Give *three* reasons to show that the man to whom Emerson refers in the following quotation is the rich and royal man:

> He who knows the most; he who knows what sweets and virtues are in the ground, the waters, the plants, the heavens, and how to come at these enchantments,—is the rich and royal man. Only as far as the masters of the world have called in nature to their aid, can they reach the hight of magnificence.

13 Give an account of Franklin's first visit to London.

14 Give the circumstances under which Washington wrote the *Farewell address*, and select from it *two* thoughts that seem to you the most important.

15 Mention the occasion of delivery of Lincoln's *Gettysburg address*, and give *three* reasons that entitle it to a place in standard American literature.

High School Department

167TH EXAMINATION

AMERICAN SELECTIONS

Tuesday, January 22, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Give a sketch of the life of Cooper, showing the influence of his early associations on his writings.

2 Describe the closing scene in the *Last of the Mohicans.*

3 Give an account of the last interview between Hepzibah and Judge Pyncheon.

4 Show how *Thanatopsis a*) interprets the language of nature, *b*) teaches a moral lesson.

5 State the theme of the *Present crisis,* justifying the statement by references to the poem.

6 Give the names of *five* of Lowell's garden acquaintances, and mention an incident observed by him in connection with each.

7 Give in detail, from *A glance behind the curtain,* Cromwell's reasons for not yielding to Hampden's entreaty to leave England.

8 Describe *two* pictures in the *Hanging of the crane.*

9 Sketch the circumstances that led Lars to leave Norway.

10 Give, from *Reveries of a bachelor,* an account of the childhood of Paul and Bella.

11 Relate, from the *Alhambra,* the story of *one* of the following: Peregil, Jacinta, Lope Sanchez, Martin Yañez de Barbudo.

12 Give an account of what Emerson says in his essay on *Nature* regarding *one* of the following statements:

a Nature is loved by what is best in us.

b Exaggeration is in the course of things.

c The hunger for wealth, which reduces the planet to a garden, fools the eager pursuer.

[1]Mention the three aspects of beauty given by Emerson in his longer essay on *Nature.*

13 Relate, from the *Autobiography,* incidents showing that the qualities of resolution and justice formed a part of Franklin's character.

14 Give a sketch of Lincoln's *Gettysburg address.*

15 Write on *one* of the following topics: *a*) The palace of the Alhambra, *b*) The story of Alice Pyncheon, *c*) Life and character of Emerson.

[1]This alternative is for those who for this examination have read the longer essay.

High School Department

169TH EXAMINATION

AMERICAN SELECTIONS

Tuesday, June 18, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Give, from the *Last of the Mohicans*, an account of the adventures of Heyward and the Munro girls up to the time of their meeting Hawkeye and the Mohicans.

2 Describe the garden belonging to the house of the seven gables.

3 Give the substance of a passage from *Thanatopsis* that shows *a*) the magnificence of man's final resting place, *b*) Bryant's belief that a noble life is the best preparation for death.

4 Explain the meaning of the title of each of *two* of the following: *a*) *The present crisis*, *b*) *A glance behind the curtain*, *c*) *Commemoration ode.*

5 Give the story of life as outlined in the *Hanging of the crane.*

6 Write the story of Brita's brooch as given in *Lars* and show its significance in the poem.

7 Give, from *My garden acquaintance*, a sketch of what Lowell says concerning *a*) crows, *b*) orioles.

8 In *Reveries of a bachelor*, to what character does the author liken *a*) sea-coal fire, *b*) anthracite fire? Give Mitchell's account of *one* of these characters.

9 Relate, from the *Alhambra*, the legend of Don Munio Sancho de Hinojosa.

10 State *three* important thoughts from the essay on *Nature* and explain *one* of them.

11 Give an account of Franklin's first journey from Boston to Philadelphia.

12 Give, from the *Farewell address*, Washington's opinion regarding party spirit.

13 Give, from the *Gettysburg address*, an account of what Lincoln says concerning dedication and show how his life is an illustration of this sentiment.

14 Select *two* of the following characters from the literature studied in this course, and sketch a scene in which each character selected appears: Uncas, Phoebe Pyncheon, Ezra Mendenhall, Enrica, Governor Manco.

15 Mention the poem from which each of *two* of the following quotations is taken and explain the references in the quotations selected:

a So spake he, and meantime the other stood
With wide gray eyes still reading the blank air,
As if upon the sky's blue wall he saw
Some mystic sentence, written by a hand,
Such as of old made pale the Assyrian king,
Girt with his satraps in the blazing feast.

b How beautiful to see
Once more a shepherd of mankind indeed,
Who loved his charge, but never loved to lead.

c On the round table in the hall
Another Ariadne's crown
Out of the sky hath fallen down;
More than one monarch of the moon
Is drumming with his silver spoon.

d Two hours, afar,
Behind the wintry peaks of Justedal,
Unmarked, he climbed; then, pausing on the crest
Of Fille Fell, he gathered up his beams
Dissolved in warmer blue, and showered them down
Between the mountains, through the falling vale,
On Ulvik's cottages and orchard trees.

High School Department

165TH EXAMINATION

FRENCH—First Year

August 1900—Three hours, only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-2 Translate into English:

LA MARE AU DIABLE

Mais l'enfant n'entendit rien. Il se prit à pleurer, disant que puisque son père emmenait la petite Marie, il pouvait bien l'emmener aussi. On lui objecta qu'il fallait passer les grands bois, qu'il y avait là beaucoup de méchantes bêtes qui mangeaient les petits enfants, que la Grise ne voulait pas porter trois personnes, qu'elle l'avait déclaré en partant, et que dans le pays où l'on se rendait, il n'y avait ni lit ni souper pour les marmots. Toutes ces excellentes raisons ne persuadèrent point Petit-Pierre; il se jeta sur l'herbe, en criant que son petit père ne l'aimait plus, et que s'il ne l'emmenait pas, il ne rentrerait point du jour ni de la nuit à la maison.

marmot = little one

3-4 Translate into English:

LE ROI DES MONTAGNES

Que veux-tu? Tu serais brigand, sans les idées de ta mère. Elle a toujours prétendu que tu manquais de vocation. A ta santé! A la vôtre, monsieur l'Allemand! Je vous présente mon filleul, le capitaine Périclès, un charmant jeune homme qui sait plusieurs langues, et qui voudra bien me remplacer auprès de vous pendant mon absence. Mon cher Périclès, je te présente monsieur, qui est docteur et qui vaut quinze mille francs. Croirais-tu que ce grand docteur-là, tout docteur qu'il est, n'a pas encore su faire payer sa rançon par nos Anglaises! Le monde dégénère, petit: il valait mieux de mon temps.

filleul = godchild

5-6 Translate into English:

LA FUITE DE VARENNES

Les voitures du roi roulaient sur la route de Châlons; les relais de huit chevaux étaient commandés à toutes les postes, un moment d'avance. Cette quantité de chevaux, la grandeur et la forme remarquable de la berline, le nombre des voyageurs

qui en occupaient l'intérieure, les gardes du corps, dont la livrée s'accordait mal avec leur noble physionomie et leur attitude militaire, cette figure bourbonienne de Louis XVI assis au fond, dans le coin de la voiture, et qui contrastait avec le rôle de valet de chambre qu'avait emprunté le roi, toutes ces circonstances étaient de nature à éveiller les soupçons sur la route et à compromettre le salut de la famille royale.

berline = coach

7 Translate into French:

a) Today is the seventeenth of August, *b*) The children go to bed at sunset, *c*) It was very warm in the city yesterday, *d*) Here is the book, I will give it to him, *e*) Whose flowers are these on the table?

8 Conjugate the imperfect indicative active of *craindre*, the preterit (past definite) of *venir*, the future of *faire*, the imperative of *être*, the present subjunctive of *aller*.

9 Write in French the names of the months and of the days of the week.

10 Write the masculine form of *each* of the following adjectives: *vive*, *ancienne*, *publique*, *douce*. Compare *mauvais*, *bon*, *peu*.

11 Translate into French: *a*) It is not yet two o'clock, *b*) He is right, don't be angry with him, *c*) I don't know what to do, *d*) Let us go away, I want nothing, *e*) Please send for my brother.

12 Write the third person singular of *each* of the tenses of the indicative and subjunctive of *avoir*. Mention in each case the name of the tense.

13 Answer the following questions by complete French sentences: *a*) Depuis quand êtes-vous en vacance? *b*) Quel temps fait-il aujourd'hui? *c*) Où demeurez-vous? *d*) Combien de personnes y a-t-il dans cette chambre? *e*) Aimez-vous mieux l'été ou l'hiver?

14 Write original French sentences containing *a*) a reflexive verb, *b*) an impersonal verb, *c*) a verb in the passive voice, *d*) the preposition *chez*, *e*) a disjunctive personal pronoun.

15 Write from memory and translate 10 consecutive lines of any French poem.

High School Department

167TH EXAMINATION

FRENCH—First Year

Monday, January 21, 1901—1.15 to 4.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

LE REQUIEM

Un jour que Mozart était plongé dans une profonde rêverie, il entendit un carrosse s'arrêter à sa porte. On lui annonce un inconnu qui demande à lui parler: on le fait entrer; il voit un homme d'un certain âge, fort bien mis, les manières les plus nobles, et même quelque chose d'imposant: "Je suis chargé, monsieur, pour un homme très considérable, de venir vous trouver."—"Quel est cet homme?" interrompit Mozart.—"Il ne veut pas être connu."—"A la bonne heure, et que désire-t-il?"—"Il vient de perdre une personne qui lui était bien chère, et dont la mémoire lui sera éternellement précieuse; il veut célébrer tous les ans sa mort par un service solennel, et il vous demande de composer un requiem pour ce service."

carrosse = carriage, *bien mis* = well dressed, *considérable* = respectable, *à la bonne heure* = very well

3–4 Translate into English:

LE VIEUX PÊCHEUR

Dans une petite cabane, près de la mer, habitait un vieux pêcheur avec sa femme et plusieurs enfants.

Il avait eu toute sa vie bien du mal pour nourrir et élever sa famille. Cependant il vivait heureux. Ses enfants grandissaient auprès de leur mère; et il se sentait la force de travailler encore pendant longtemps.

Tous les pêcheurs des environs le connaissaient pour son courage.

Un jour, après une belle matinée, la mer était tout à coup devenue grosse. Le pêcheur se hâtait de revenir à la côte, quand il aperçut une barque: c'était celle d'un jeune étranger qui était allé faire une promenade en mer.

La barque, mal gouvernée, était emportée par les vagues, et elle allait bientôt se briser contre les rochers. Le vieux pêcheur n'hésite pas: il va au secours de la barque en détresse.

pêcheur = fisherman, *gros* = rough

5–6 Translate into English:

LA NORWÉGE

En Norwége l'hiver est long, le blé est cher, la vie est dure. On travaille beaucoup; on gagne peu. L'ombre d'un sou est aussi rare en Norwége qu'un rayon de soleil. La morue sèche est le pain des pauvres. Le pain de sciure est bien connu en Norwége. C'est un mets sain, mais peu appétissant.

Tout paysan français déjeune d'une bonne tranche de pain et d'une bonne tasse de café; à l'heure du dîner la soupière fume sur la table. En Norwége le café est un luxe dans les cabanes des pauvres; la viande est un luxe dans les maisons des riches.

Norwége = Norway, *blé* = corn, *morue* = codfish, *sciure* = sawdust, *mets* = dish, *tranche* = slice

7 Translate into French: *a*) I have seen his father and his mother, *b*) Where are your books? I have given them to the professor, *c*) Are you a Frenchman? No, I am an American, *d*) Would you like some milk? No, I thank you, *e*) There are flowers in the garden.

8 Conjugate the pluperfect indicative of *venir;* the present indicative active of *jeter;* the imperfect indicative of *se plaindre.* [Do not omit the pronouns.]

9 Give *two* rules regarding the position of adjectives and illustrate each by an original French sentence. Compare *haut*, *petit.*

10 Translate into English: *a*) Voici le livre dont on a parlé, *b*) Je n'ai vu personne, *c*) Je serai chez moi à midi, *d*) Je ne sais lire et écrire, *e*) Elle est allée voir son oncle.

11 Translate into French: *a*) Whom have you seen? *b*) the man whom you have seen, *c*) some fine houses, *d*) every year, *e*) many men.

12 Write the plural of *eau*, *voix*, *pied*, *carnaval*, *rival;* the feminine of *gai*, *cruel*, *faux*, *blanc*, *actif.*

13 Write the third person singular of the following verb forms: preterit (past definite) and future indicative of *aller;* imperfect and preterit indicative active of *commencer;* present indicative and present subjunctive active of *craindre;* present and imperfect subjunctive active of *dire;* present and future indicative active of *faire.*

14 Indicate the gender of *each* of the following nouns: *crème*, *victoire*, *printemps*, *thé*, *robe*, *maison.* Write the feminine of *un malade*, *un duc*, *un acteur*, *un danseur.*

15 Write from memory and translate at least 10 consecutive lines of any poem in the memory selections required for first year French.

High School Department

169TH EXAMINATION

FRENCH—First Year

Monday, June 17, 1901—1.15 to 4.15 p. m., only

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nswer questions 7 and 8 and eight of the others but **no more.** *If e than eight of the others are answered only the first eight answers ' be considered. Division of groups is not allowed. Each complete wer will receive 10 credits. Papers entitled to 75 or more credits ! be accepted.*

–2 Translate into English:

BEAU DÉVOUEMENT D'UN FILS

ıprès la bataille d'Actium, Auguste, vainqueur, fit la revue prisonniers. Métellus, un de ses plus cruels ennemis, it du nombre. Quoique la misère et le chagrin l'eussent ucoup défiguré, son fils, qui servait dans l'armée victorieuse, econnut et courut se jeter dans ses bras. Se tournant ente, les larmes aux yeux, vers Auguste: "Seigneur," lui il, "mon père a été votre ennemi, et, comme tel, il mérite mort; mais je vous ai servi fidèlement et je mérite une ompense. Pour prix de mes services, accordez la vie à n père et faites-moi mourir à sa place." Auguste, touché la piété filiale du jeune Métellus, pardonna à son père.

rix=reward

–4 Translate into English:

L'HISTOIRE D'UN ESTROPIÉ

orsque j'habitais la charmante ville de Tarbes, je voyais tes les semaines à ma porte un pauvre estropié appelé quelon, assis de côté sur un petit âne et suivi d'une femme de trois enfants. Je leur donnais toujours quelque chose, j'écoutais toujours sans impatience l'histoire lamentable que quelon récitait sous ma fenêtre. "Bonnes âmes," disait-il, sistez un pauvre homme qui a été un bon ouvrier et qui n'a mérité son malheur. J'avais une cabane et un bout de e dans la montagne; mais un jour que je travaillais de grand ır, la montagne a croulé et m'a traité comme me voilà."

tropié=cripple, *âne*=donkey, *bout*=bit, *crouler*=fall

-6 Translate into English:

LE LIEUTENANT

e lieutenant s'assied, on cause. Il accepte notre déjeuner; sse l'après-midi à la maison. Maman est enchantée de

lui; ma sœur le regarde beaucoup et moi donc! Il est gai, spirituel. Il nous raconte des histoires sur un vieux maréchal de l'armée, l'homme du monde qui a le plus de décorations, qui est obligé de mettre la moitié de ses croix à l'intérieur de son habit tant il en a; qui dort avec le grand cordon de la légion d'honneur en travers de la poitrine et est tellement fanatique de l'uniforme, que dans son bain, il garde sur la tête son chapeau des jours de revue empanaché de plumes blanches.

causer = chat, *spirituel* = witty, *cordon* = ribbon, *bain* = bath, *empanacher* = adorn with plumes

7 Translate into French: *a*) His queen is more capable of reigning than he, *b*) The sun was setting when the emperor came, *c*) I am sorry that you do not like to be in Paris, *d*) Will you please close the door and the windows? *e*) Do you want some milk? Yes, if you please.

8 Conjugate *craindre* in the present indicative active, *se mourir* in the preterit (past definite), *savoir* in the imperfect indicative active. [Do not omit the pronouns.]

9 Translate into French: *a*) It is half past two, *b*) The Smiths have arrived, *c*) He was sent for, *d*) Get thee gone, *e*) Keep to the right, *f*) Act like a man, *g*) Where do you live? *h*) What is your name? *i*) How can I help it? *j*) Have you a grudge against him?

10 Write the feminine of *ancien*, *secret*, *long*, *franc*, *gai;* the masculine of *merveilleuse*, *favorite*, *enchanteresse*, *fraiche*, *brève*.

11 Write in French the year, month, day, hour and minute of answering this question. [Do not use figures.]

12 Form an adverb from *each* of the following: *complet*, *sage*, *bon*, *doux*, *cruel*, *sec*. Compare *mal*, *peu*.

13 Distinguish between *il dit* and *il dît*, *vous dites* and *vous dîtes*. Conjugate *fuir* in the present subjunctive, *vivre* in the preterit (past definite).

14 Write the plural of the conjunctive and of the disjunctive personal pronouns.

15 Write from memory and translate at least 10 consecutive lines of *one* of the following poems: *La tombe dit à la rose*, *La feuille desséchée*, *Etoiles filantes*, *Chanson de Barberine*.

High School Department

167TH EXAMINATION

FRENCH — Second Year

Monday, January 21, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

LA TULIPE NOIRE

La veille de la floraison de la fleur, la tulipe a été enlevée de chez moi par cette jeune fille, portée dans sa chambre, où j'ai eu le bonheur de la reprendre au moment où elle avait l'audace d'expédier un messager pour annoncer à MM. les membres de la Société d'horticulture qu'elle venait de trouver la grande tulipe noire; mais elle ne s'est pas démontée pour cela. Sans doute pendant les quelques heures qu'elle l'a gardée dans sa chambre, l'aura-t-elle montrée à quelques personnes qu'elle appellera en témoignage? Mais heureusement, monseigneur, vous voilà prévenu contre cette intrigante et ses témoins.—*Dumas*

démonter = disconcert

3–4 Translate into English:

LE DERNIER CARRÉ

Quand cette légion ne fut plus qu'une poignée, quand leur drapeau ne fut plus qu'une loque, quand leurs fusils épuisés de balles, ne furent plus que des bâtons, quand le tas de cadavres fut plus grand que le groupe vivant, il y eut parmi les vainqueurs une sorte de terreur sacrée autour de ces mourants sublimes, et l'artillerie anglaise, reprenant haleine, fit silence. Ce fut une espèce de répit. Ces combattants avaient autour d'eux comme un fourmillement de spectres, des silhouettes d'hommes à cheval, le profil noir des canons, le ciel blanc aperçu à travers les roues et les affûts.—*Hugo*

carré=square, *loque*=tatter, *épuiser*=exhaust, *fourmillement* = swarming, *affût*=gun-carriage

5–6 Translate into English:

UN PHILOSOPHE SOUS LES TOITS

Madeleine ne se possède point de joie. Toute sa vie elle a rêvé un dîner sur l'herbe! En aidant sa sœur à retirer du panier les provisions, elle me raconte toutes les parties de campagnes projetées et remises. Françoise, au contraire, a été

élevée à Montmorency; avant de rester orpheline, elle est plusieurs fois retournée chez sa nourrice. Ce qui a, pour sa sœur, l'attrait de la nouveauté, a pour elle le charme du souvenir. Elle raconte les vendanges auxquelles ses parents l'ont conduite; les promenades sur l'âne de la mère Luret, qu'on ne pouvait faire aller à droite qu'en le poussant à gauche; la cueillette des cerises et les navigations sur le lac, dans la barque du traiteur.—*Souvestre*

se posséder = control oneself, *vendange* = vintage, *cueillette* = gathering, *traiteur* = innkeeper

7 Translate into French: *a*) The man of whom you speak was here a week ago, *b*) I will go to find him if you yourself do not go, *c*) Though it was cold, the entire morning was fine, *d*) The books that I have mentioned were found in the old mansion down there.

8 Conjugate the present indicative of *s'asseoir;* the imperative of *aller;* the imperfect subjunctive of *devoir;* the preterit (past definite) of *vivre.* [Do not omit the pronouns.]

9 Translate into English: *a*) Ma montre vaut mieux que la vôtre, *b*) Il rit sous cape, *c*) On a beau lui donner des conseils, *d*) C'est fait de moi, *e*) Je ne sais que dire, *f*) Mettez vos gants, *g*) Elle assiste à la leçon, *h*) Vous entendrez de ses nouvelles, *i*) Trouvez-vous que cet habit aille bien? *j*) Voilà un homme comme il faut!

10 Mention *three* rules for the use of the subjunctive and illustrate each by an original French sentence.

11 Translate into French: *a*) We both take a walk every day for an hour, *b*) She washed her hands, *c*) An accident happened to my uncle, *d*) The old woman lives in that little green cabin, *e*) We are not more than fifteen years old.

12 Write the present active participle and the past participle of *connaître*, *devoir*, *écrire*, *joindre*, *résoudre*.

13 Translate into French: *a*) The former may come, but the latter may be counted on, *b*) Whatever he may say no one ought to obey him, *c*) Many a time he himself insisted on the same thing, *d*) Every one of them wondered who could do such a thing, *e*) What a man he must seem to others!

14 Write the singular of *les nez*, *les bijoux*, *les cheveux*, *les cieux*, *les yeux*.

15 Write from memory and translate at least 15 consecutive lines of any poem in the memory selections required for second year French.

High School Department

169TH EXAMINATION

FRENCH—Second Year

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

HISTOIRE D'UN CONSCRIT DE 1813

Nous étions tout à fait contents, et personne ne se serait douté des terribles choses qui devaient s'accomplir en ce jour. On croyait les Russes et les Prussiens bien loin à nous chercher derrière la Gruna-Bach, mais ils savaient où nous étions; et tout à coup, sur les dix heures, le général Souham, au milieu de ses officiers, monta la côte ventre à terre; il venait d'apprendre quelque chose. J'étais justement en sentinelle près des faisceaux; il me semble encore le voir—avec sa tête grise et son grand chapeau bordé de blanc—s'avancer à la pointe de la colline, tirer une grande lunette et regarder, puis revenir bien vite et descendre au village en criant de battre le rappel.

—*Erckmann-Chatrian*

ventre à terre=at full speed, *faisceau*=stack of guns

3–4 Translate into English:

UN VENDREDI-SAINT SOUS LA TERREUR

Son examen terminé, il déposa les dossiers sur le bureau, en disant à son secrétaire: "Tous ces gens-là ont mérité la mort. Ils seront condamnés ce matin et exécutés ce soir. Le plus coupable d'entre eux est, d'ailleurs, ce banquier Geneste, qui expédiait à sa femme émigrée à Bruxelles les lingots d'argent. A eux deux, ils voulaient épuiser le numéraire et discréditer les assignats. C'est dommage que l'homme seul ait été incarcéré. Mais la femme aura son tour. On est sur ses traces. Elle n'échappera pas au glaive des lois. En attendant, ne songeons qu'à châtier ceux de ces brigands qui sont dans nos mains."—*Ernest Daudet*

dossier = document, *lingot* = bar, *épuiser* = exhaust, *numéraire* = specie, *assignat* = paper money, *glaive* = punishment, *châtier* = chastise

5–6 Translate into English:

L'ŒUF DE PÂQUES

J'apercevais tout au loin la campagne déjà verte, et à ma droite, le Rhône sur les flots bleus duquel, tendant leurs voiles blanches, de petites barques passaient. En bas, dans la rue,

un rémouleur chantait tout en faisant siffler la roue de sa meule; et dans le silence matinal des êtres et des choses, sa chanson montait jusqu'à moi, mêlée au bruissement de la pierre sous le fer.

Tout à coup, presque en face de moi, une fenêtre s'ouvrit, une main passa, poussant l'étroit volet qui cria sur ses gonds, puis une tête parut, une jolie tête blonde, aux grands yeux bleus et aux cheveux ébouriffés de la plus amusante façon.

—*Beissier*

rémouleur = knife-grinder, *volet* = window-shutter, *gond* = hinge, *ébouriffé* = disheveled

7 Translate into French: *a*) France and Paris are, it is said, the sources respectively of liberty and fashion, *b*) I don't doubt that he is coming, *c*) If you have anything to say to me, say it quickly, *d*) Your ancestors and mine risked their heads for this principle, *e*) Are you ill? Yes, I am.

8 Conjugate *sentir* in the preterit (past definite) active, *valoir* in the present and imperfect subjunctive, *souffrir* in the present indicative active, *s'ennuyer* in the present subjunctive. [Do not omit the pronouns.]

9 Distinguish in meaning *épais* and *dense*, *là* and *y* meaning *there*. State the rules governing the use of *à* and *en* before the names of places or countries.

10 Translate into English: *a*) Il donna le coup de grâce, *b*) Jean manque de savoir-vivre, *c*) Cela m'était égal, *d*) Coûte que coûte, *e*) Cela marche, *f*) bras dessus bras dessous, *g*) le coup de canon, *h*) à porte entr'ouverte, *i*) de grand matin, *j*) à son égard.

11 Mention *three* uses of the present tense, *two* uses of the future tense. Illustrate each by an original French sentence.

12 Write the second person singular of *avoir* in the indicative and conditional active.

13 Translate into French: *a*) They heard her singing, *b*) We retain loving thoughts of the absent, *c*) Let us live and die regarding all men as brothers, *d*) A way once lost is regained with difficulty, *e*) Everything that they were looking for has been found.

14 State *three* rules for the position of adjectives. Illustrate each by an original French sentence.

15 Write from memory and translate at least 10 consecutive lines of any *one* of the following poems: *Mon habit*, *La source*, *Le vase brisé*, *Les deux routes*.

High School Department

167TH EXAMINATION

FRENCH — Third Year

Monday, January 21, 1901 — 1.15 to 4.15 p. m., only

Answer question 7 and nine of the others but **no more.** *If more than nine of the others are answered only the first nine answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

LE CID

Chimène — Sire, il n'est plus besoin de vous dissimuler
Ce que tous mes efforts ne vous ont pu celer.
J'aimais, vous l'avez su; mais pour venger mon père,
J'ai bien voulu proscrire une tête si chère:
Votre Majesté, Sire, elle-même a pu voir
Comme j'ai fait céder mon amour au devoir.
Enfin Rodrigue est mort, et sa mort m'a changée
D'implacable ennemie en amante affligée.
J'ai dû cette vengeance à qui m'a mise au jour,
Et je dois maintenant ces pleurs à mon amour.
Don Sanche m'a perdue en prenant ma défense,
Et du bras qui me perd je suis la récompense! — *Corneille*

3–4 Translate into English:

L'AVARE

Valère — Oui; mais apprenez, pour vous confondre, vous, que son fils, âgé de sept ans, avec un domestique, fut sauvé de ce naufrage par un vaisseau espagnol, et que ce fils sauvé est celui qui vous parle; apprenez que le capitaine de ce vaisseau, touché de ma fortune, prit amitié pour moi; qu'il me fit élever comme son propre fils, et que les armes furent mon emploi dès que je m'en trouvai capable; que j'ai su depuis peu que mon père n'était point mort, comme je l'avais toujours cru; que passant ici pour l'aller chercher, une aventure, par le Ciel concertée, me fit voir la charmante Elise; que cette vue me rendit esclave de ses beautés; et que la violence de mon amour, et les sévérités de son père, me firent prendre la résolution de m'introduire dans son logis, et d'envoyer un autre à la quête de mes parents. — *Molière*

5–6 Translate into English:

RUY BLAS

Ruy Blas — Oh! n'allez point par là, ce n'en est pas la peine,
J'ai poussé le verrou depuis longtemps déjà. —
Marquis, jusqu'à ce jour Satan te protégea,
Mais, s'il veut t'arracher de mes mains, qu'il se montre.
— A mon tour! — On écrase un serpent qu'on rencontre.

—Personne n'entrera, ni tes gens, ni l'enfer!
Je te tiens écumant sous mon talon de fer!
—Cet homme vous parlait insolemment, madame?
Je vais vous expliquer. Cet homme n'a point d'âme,
C'est un monstre. En riant hier il m'étouffait.
Il m'a broyé le cœur à plaisir. Il m'a fait
Fermer une fenêtre, et j'étais au martyre!
Je priais! je pleurais! je ne peux pas vous dire.—*Hugo*

verrou = bolt, *écumant* = frothing, *broyer* = crush

7 Translate into French: We have not sufficient means of observation for criticizing competently an ancient author. To go back to the man, book in hand, is impossible. So then we are reduced either to commenting on the work and admiring it or to dreaming of the author from a distance.

8 Conjugate the present and the future indicative active of *acquérir*, the present subjunctive of *mourir*, the imperfect subjunctive of *venir*, the imperative of *courir*.

9 Distinguish between *a*) *en* and *dans* when expressing time, *b*) *jour* and *journée*, *c*) *avant*, *auparavant* and *devant* meaning *before*, *d*) *depuis*, *pendant* and *pour* denoting duration of time.

10 Mention *a*) *three* uses of the infinitive, *b*) *two* uses of the present participle. Write an original French sentence illustrating each.

11 Give the verb stem from which *each* of the following is formed in the active voice and show the process of formation: the imperfect indicative, the present conditional, the imperative, the present subjunctive, the imperfect subjunctive.

12 Translate into French: The body of Virginia was still in the same attitude; her eyes were closed and there was serenity on her brow; only the pale violets of death were blended on her cheeks with the roses of modesty.

13 Translate into English: *a*) Cet habit dégage bien la taille, *b*) Tôt ou tard la vérité se fait jour, *c*) La folie reprend le dessus, *d*) Cette affaire a un oeil louche, *e*) Sachez-lui gré d'avoir voulu, *f*) Je vous en souhaite, *g*) Elle s'est endimanchée, *h*) J'ai failli un coup, *i*) Faites jouer la mine, *j*) Jusqu'au petit jour.

14 Write in French about 75 words on the life and works of *one* of the following: Le Sage, Chénier, Daudet.

15 Write from memory and translate at least 15 consecutive lines of any poem in the memory selections required for third year French.

High School Department

169TH EXAMINATION

FRENCH—Third Year

Monday, June 17, 1901—1.15 to 4.15 p. m., only

Answer question 7 and nine of the others but **no more.** *If more than nine of the others are answered only the first nine answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

POLYEUCTE

Sévère—Je ne la puis du moins blâmer d'un mauvais choix,
Polyeucte a du nom, et sort du sang des rois.
Faibles soulagements d'un malheur sans remède!
Pauline, je verrai qu'un autre vous possède!
O ciel, qui malgré moi me renvoyez au jour,
O sort, qui redonniez l'espoir à mon amour,
Reprenez la faveur que vous m'avez prêtée,
Et rendez-moi la mort que vous m'avez ôtée.
Voyons-la toutefois, et dans ce triste lieu
Achevons de mourir en lui disant adieu;
Que mon cœur, chez les morts emportant son image,
De son dernier soupir puisse lui faire hommage!—*Corneille*

3–4 Translate into English:

LE BARBIER DE SÉVILLE

Bazile—La calomnie, monsieur? Vous ne savez guère ce que vous dédaignez . . . D'abord, un bruit léger, rasant le sol comme l'hirondelle avant l'orage, *pianissimo*, murmure et file et sème en courant le trait empoisonné. Telle bouche le recueille, et *piano*, *piano* vous le glisse en l'oreille adroitement. Le mal est fait, il germe, il rampe, il chemine, et *rinforzando* de bouche en bouche il va le diable; puis, tout à coup, ne sais comment, vous voyez la calomnie se dresser, siffler, s'enfler, grandir à vue d'œil. Elle s'élance, étend son vol, tourbillonne, enveloppe, arrache, éclate et tonne, et devient, grâce au ciel, un cri général, un *crescendo* public, un *chorus* universel de haine et de proscription.—*Beaumarchais*

5–6 Translate into English:

GIL BLAS

Je ne fus pas sitôt au logis, que le docteur Sangrado y arriva. Je lui parlai des malades que j'avais vus, et lui remis entre les mains huit réaux qui me restaient des douze que j'avais reçus pour mes ordonnances. "Huit réaux," me dit-il, après les avoir comptés; "c'est peu de chose pour deux visites: mais il faut

tout prendre." Aussi les prit-il presque tous. Il en garda six; et me donnant les deux autres: "Tiens, Gil Blas," poursuivit-il, "voilà pour commencer à te faire un fonds; de plus, je veux faire avec toi une convention qui te sera bien utile: je t'abandonne le quart de ce que tu m'apporteras. Tu seras bientôt riche, mon ami; car il y aura, s'il plaît à Dieu, bien des maladies cette année."—*Le Sage*

ordonnance=prescription

7 Translate into French: Molière and Shakspere have a like nature with this difference, it seems to me, that in common life Shakspere, the poet of the horrible, develops spontaneously a merrier tone, and Molière, the jocund merrymaker, allows himself to relapse into melancholy.

8 Distinguish between *a*) *longtemps* and *longuement*, *b*) *plaindre* and *se plaindre*, *c*) *maison* and *logis*, *d*) *bord*, *côte*, *rive* and *rivage*.

9 Mention *three* classes of French verbs that are conjugated with *être*, giving an example of each. Illustrate by original French sentences the difference in use between the present subjunctive and the imperfect subjunctive.

10 Translate into French: *a*) Let him in, *b*) He heard it spoken of, *c*) Do not think so, *d*) The window opens on the garden, *e*) He took aim, *f*) I have come for you, *g*) Only to see it, *h*) Have you a headache? *i*) Whom do you mean? *j*) How beautiful it is!

11 Write all the infinitives and participles of *boire*.

12 Translate into English: *a*) *un bon homme*, *b*) *un maître français*, *c*) *un homme grand*, *d*) *une femme petite*, *e*) *un malheureux auteur*, *f*) *un unique poème*, *g*) *un ton haut*, *h*) *un triste homme*, *i*) *une mortelle année*, *j*) *son propre uniforme*.

13 Mention *three* verbs that always require *de* before a following infinitive, *two* verbs that always require *à* before a following infinitive. Write an original French sentence illustrating the construction with *each* of the verbs you have mentioned.

14 Write in French about 75 words on the life, character and works of *one* of the following: Corneille, Jean Jacques Rousseau, Victor Hugo.

15 Write from memory and translate at least 10 consecutive lines of *one* of the following poems: *La Marseillaise*, *Le retour dans la patrie*, *La pauvre fleur*, *L'écho*.

High School Department

165TH EXAMINATION

GERMAN — First Year

August 1900 — Three hours, only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

DIE NACHTIGALL

Kalt und bleich lag der Kaiser in seinem prächtigen Bette; der ganze Hof glaubte ihn tot, und ein jeder lief hin, den neuen Kaiser zu begrüfsen. Rings umher in allen Sälen und Gängen war Tuch gelegt, damit man keinen Fufstritt vernehme, und deshalb war es da ganz still! Aber der Kaiser war noch nicht tot; steif und bleich lag er in dem prächtigen Bette; hoch oben stand ein Fenster offen, und der Mond schien herein auf ihn. Der arme Kaiser konnte kaum atmen; es war, als ob etwas auf seiner Brust säfse; er schlug die Augen auf und sah, dafs es der Tod sei, der auf seiner Brust safs und sich seine goldene Krone aufgesetzt hatte und in der einen Hand des Kaisers goldenen Säbel, in der andern seine prächtige Fahne hielt.

vernehmen = hear, *Fahne* = flag

3–4 Translate into English:

SIEGFRIEDS JUGEND

Woher war der Knabe nur gekommen? Und wer waren die Eltern? Darüber hatte Mime oft gesonnen, und wie viel er im Stillen auch geforscht und nachgefragt hatte — eine Antwort bekam er nicht. Auch sonst hatte er am Kinde nichts gefunden, das ihm Aufklärung hätte geben können, nur im Schifflein, in dem der Knabe einst gekommen war, hatte er ein in Stücke gebrochenes, mächtig breites Schwert gefunden, und darauf hatte er in roten Lettern die Buchstaben Sieg . . . gelesen, und da meinte er, es mögen vielleicht die Anfangsbuchstaben eines Namens sein, und nannte deshalb den Knaben Siegfried.

forschen = search

5–6 Translate into English:

DER VERGESSENE KOFFER

Ich sprang die Treppe hinunter und eilte über die Straſse hinüber in einen der noch hell erleuchteten Spielwarenläden. Dort kaufte ich ein hölzernes Pferd, eine Trommel, Bleisoldaten, und was mir sonst unter die Hände kam, zusammen und machte mich, bis oben hinauf bepackt, auf den Rückweg. Den Jubel, mit dem der kleine Kerl mich und die unverhoffte Bescherung empfing, hättet ihr hören sollen. Er wollte mir noch lange nachher nicht aus den Ohren. Ein paar Tage später reiste die Frau mit ihrem Knaben weiter. Möge Gott sie glücklich in die Arme ihres Gatten und mit ihm in die neue Heimat geleitet haben! Ich habe nichts wieder von ihr gehört.

Jubel = exultation, *Bescherung* = gift, *Gatte* = husband

7 Translate into German: *a*) There was once a very old man, *b*) That house is much higher than this, *c*) They had come a few days before, *d*) This is the book I found, *e*) Follow me, if you please.

8 Give the synopsis of *verstehen* in the third person singular of the indicative and subjunctive, active. Write the imperfect indicative active and the present subjunctive active of *fliegen*.

9 Decline throughout the German for *my poor child, the little dog*.

10 Write the principal parts of *anklopfen, beiſsen, erziehen, schieſsen, treiben*.

11 Compare *kalt, viel, laut*. Write the second and the third person singular of the present indicative active of *sterben, lassen*.

12 Write original German sentences illustrating the use of *each* of the following prepositions: *an, aus, ohne, trotz, während*.

13 Translate into German: *a*) You have still time enough, it is only a quarter past three, *b*) Wait a moment, I am coming with you, *c*) Do you know my friend, Miss Brown?

14 Write and translate original German sentences illustrating the use of *three* of the modal auxiliaries.

15 Write from memory and translate 10 consecutive lines of any German poem.

High School Department

166TH EXAMINATION

GERMAN — First Year

ıesday, September 25, 1900—9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more ın eight of the others are answered only the first eight answers will considered. Division of groups is not allowed. Each complete answer ll receive 10 credits. Papers entitled to 75 or more credits will be epted.*

1–2 Translate into English:

HAGEN

Da lebte einst in Irland eine Königin, die hatte nur einen ızigen Sohn und sonst keinen Verwandten mehr im Lande. diesem sprach sie eines Tages: "Du wirst nun bald das ter erreichen, da du dir eine Frau nehmen mufst und König rden sollst. Nun lebt aber in einem Lande nördlich von r eine schöne Prinzessin, nach der wollen wir für dich ıicken und bitten, dafs man sie dir zur Gattin gebe." Und Königin that so und schickte ihre Gesandten mit vielen stbaren Geschenken an den König des Landes, in welchem Prinzessin lebte und liefs ihn bitten, dafs er ihrem Sohne ine Tochter zur Gattin gebe.

Gattin = wife, *Gesandte* = ambassador

3–4 Translate into English:

KARL DER GROSSE

Karl, der Sohn Pipins, herrschte nach dem Tode seines uders Karlmann über das ganze fränkische Reich. Aber m aufstrebenden Geiste des grofsen Mannes genügte die acht nicht, die er von seinen Vorfahren geerbt; er wollte le Völker des Abendlandes zu einem christlichen Reiche vernigen, und dieses Ziel verfolgte er während der langen Dauer iner Regierung mit eisernem Willen. Wenn ein Fürst behigt war, ein solches Ziel zu erreichen, so war es Karl der ofse, denn in ihm hatte die Natur die herrlichsten Gaben reinigt: eine rastlose Thätigkeit und einen scharfen Blick, ofse Besonnenheit und Willigkeit guten Rat zu hören, Kraft d Mut und einen frommen Sinn.

ıufstrebend = aspiring, *Dauer* = continuance, *befähigen* = fit, *sonnenheit* = discretion

5–6 Translate into English:

HILDE

Am Abend dieses Tages aber, da ringsum tiefe Stille herrschte, nahm Horand das Saitenspiel und ging aufs Dach und begann einen Sang. Der war aber so wunderbar, dafs die Vöglein im Walde die Köpfe aus den Nestern streckten, und die Hirsche aus dem Gebüsch herauskamen, und die Fische vom Grunde des Sees nach der Oberfläche schwammen, um dem Sange zu lauschen, und auch die Menschen lauschten und vergafsen den Schlaf, und die Prinzessin verliefs ihr Gemach und lauschte dem Sang; der ging ihr aber so zu Herzen, dafs sie traurig wurde, als der Gesang zu Ende war.

herrschen = reign, *Saitenspiel* = stringed instrument, *Oberfläche* = surface, *lauschen* = listen to

7 Translate into German:

a) I saw her a long time ago, *b*) The boy was bitten by a dog, *c*) Give him his book and let him go, *d*) What kind of a book is that? *e*) Where do you come from?

8 Conjugate *geben* in the present indicative active, *bitten* in the imperfect subjunctive active, *werden* in the second conditional (conditional perfect), *halten* in the present subjunctive passive, *sehen* in the future indicative passive.

9 Write, with article, the dative singular and the genitive plural of *Blatt*, *Soldat*, *Stadt*, *Blume*, *Nachbar*.

10 Write the principal parts of *anfangen*, *müssen*, *leiden*, *nehmen*, *verlieren*.

11 Decline, in singular and plural, *das alte Haus*, *blauer Himmel*.

12 Give the synopsis of *sein* in the third person singular of the indicative and subjunctive. Compare *grofs*, *froh*.

13 Give, with reason, the case of *each* italicized word in the following sentence: Er folgte *ihr* durch den *Garten* in das *Haus* und stand blau vor der *Kälte* unweit der *Thür*.

14 Translate into German: *a*) I am waiting for you, *b*) My watch has stopped, *c*) Don't be afraid of the dogs, *d*) I have not seen either of them, *e*) Why do you not go home?

15 Write from memory and translate 10 consecutive lines of any German poem.

High School Department

167TH EXAMINATION

GERMAN — First Year

Tuesday, January 22, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

AUS MEINER WELT

Adelmar, so hiefs der Jüngling, rieb sich verwundert die Augen; war es ihm doch, als müsse jemand in der Nähe sein, aber er sah nirgends etwas lebendiges, nur ein leises Lachen ertönte hinter den Bäumen. Ihn kümmerte dies wenig, wohlgemut ergriff er sein Reisebündel und marschierte weiter. Als er in die nächste Stadt kam, guckten ihm die Leute verwundert nach und einige buchstabierten sogar ganz laut: V—O—N. Im Wirtshaus verneigte sich der Wirt vor ihm fast bis zur Erde und sagte: "Es ist mir eine sehr grofse Ehre, Sie hier zu sehen, Herr V—O—N. Alles steht zu Ihren Diensten."

nirgends=nowhere, *ertönen*=sound, *nachgucken*=look after, *buchstabieren*=spell

3–4 Translate into English:

DIE TRAUMBUCHE

Da fing die Buche wieder zu rauschen an, wie vor fünf Jahren, und bewegte ihre mächtigen Zweige. Und wie sie dieselben bewegte, liefs sie wie damals bald hier, bald dort einen feinen glitzernden Sonnenstrahl durchfallen, und bald hier, bald da ein Stückchen blauen Himmel durchscheinen. Da wurde sein Herz stiller, und er schlief ein; denn er hatte vor Sorge die vorhergehenden Nächte nicht geschlafen. Und nicht lange, so träumte er denselben Traum wie vor fünf Jahren, und die Frau am Tisch und die spielenden Kinder hatten die alten, lieben Gesichter von seiner Frau und von seinen Kindern. Und die Frau sah ihn so freundlich an — ach so freundlich!

Buche=beech-tree, *rauschen* = rustle, *Sorge* = care

5–6 Translate into English:

DIE TAUBE

"Edler Ritter, als mein geliebter Mann so jung an einer gefährlichen Wunde sterben mufste, hiefs er mich zu Ihnen kommen, wenn ich je Hülfe brauchte. Er sagte mir: 'Der Ritter von Falkenburg ist ebenso gut wie tapfer, und, da du

weder Vater noch Bruder hast, mufst du ihn zu Hülfe rufen, wenn du deren bedarfst.' Meine zwei Nachbaren sind beide sehr schlimm; der eine nimmt mir meine schönen Wälder, und der andere nimmt mein Korn und mein Gras. Wenn ich klage, lachen sie beide, und da ich keine Verwandten habe, und ganz allein mit meiner Tochter und einigen treuen Bedienten wohne, denken die bösen Ritter, dafs sie thun können, was ihnen beliebt. Helfen Sie mir, Herr Ritter, sonst wird mir und meinem Kinde bald nichts mehr bleiben."

gefährlich=dangerous, *schlimm*=wicked, *belieben*=like

7 Translate into German: *a*) Tell her that I shall come tomorrow, *b*) I should like to take a walk, *c*) In summer the grass is green and the trees are full of leaves, *d*) Go quickly in order that you may meet them, *e*) The book was torn by the little boy.

8 Conjugate, in the active voice, the perfect indicative of *studieren*, the imperfect subjunctive of *sehen*, the future subjunctive of *rufen;* in the passive voice, the pluperfect indicative of *helfen*, the present subjunctive of *ergreifen*.

9 Indicate the accents of *five* of the following words, giving the reason in each case: *verstehen*, *womit*, *eiskalt*, *studieren*, *ausgehen*, *lieben*, *Student*, *Schmeichelei*, *untreu*.

10 Decline, in singular and plural, *mein neuster Hut*, *jene Blume*, *ich*.

11 Write the principal parts of *befehlen*, *frieren*, *durchscheinen*, *nennen*, *stofsen*.

12 Compare *bald*, *stolz*, *nah*. Form an adverb from *each* of the following: *vor*, *heim*, *bitter*, *manch*.

13 Translate into German: *a*) You are right, *b*) I am positive about it, *c*) He is going in half an hour, *d*) I shall have a new coat made, *e*) What will become of you?

14 Mention *two* prepositions that are followed only by the genitive; *two* prepositions that are followed only by the accusative. Write original German sentences illustrating each.

15 Write from memory and translate 10 consecutive lines of any poem in the memory selections required for first year German.

High School Department

168TH EXAMINATION

GERMAN—First Year

Friday, March 29, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

TRISTANS JUGEND

Tristan sah es und konnte nichts thun, er weinte und klagte so sehr, dafs es einen Stein hätte erbarmen können. Händeringend rief er wohl tausendmal: "O bringet mich zu meinem Vater, bringet mich zu meinem Vater!" Sein Elend war so grofs, dafs er weder Speise noch Trank zu sich nahm und nicht Acht darauf gab, wie die Nacht verging und der Tag kam und dann wiederum die Nacht. Selbst den rauhen Seeleuten ging endlich sein Jammer nahe, und einer von ihnen sprach zu ihm: "Jammere nicht so, mein Knabe, wir thun dir nichts zu leide; wohin wir gehen, da gehst du mit und hilfst uns die Völker verstehen, wenn wir zu ihnen kommen."

Speise=food, *rauh*=rough, *Jammer*=sorrow

3–4 Translate into English:

DAS GESTOHLENE KIND

Der Schäfer trat schnell in den kleinen Garten vor der Hütte. Da war der gute Einsiedler. Er safs unter einem Baume. Er hatte sein Gebetbuch in der Hand. Der Schäfer sagte ihm, wie er das Kind aus der Erde hatte kommen sehen, und wie das Kind nur von der Höhle und den Räubern sprach.

Der Einsiedler hörte alles, und als der Schäfer zu Ende war, sagte er ruhig:

"Ja, das Kind kann kein Räuberkind sein. Es ist zu fein geformt. Es mufs das Kind reicher Leute sein. Die Räuber müssen es gestohlen haben, als es sehr jung war. Ich will das Kind hier in meinem Hause behalten. Hierher kommen die Räuber sicher nicht, denn sie wissen, dafs ich weder Gold noch Silber habe, und dafs sie hier nichts zu stehlen finden."

Schäfer=shepherd, *Einsiedler*=hermit, *Höhle*=cave

5–6 Translate into English:

DAS SCHNEEGLÖCKCHEN

"Willkommen! willkommen!" sang jeder Strahl und die Blume hob sich über den Schnee hinaus in das Licht. Die Sonnenstrahlen streichelten und küfsten sie, dafs sie sich ganz öffnete, weifs wie der Schnee. Sie beugte ihren Kopf in Freude und Demut.

"Wunderschöne Blume!" sangen die Sonnenstrahlen. "Wie bist du frisch und zart! Du bist die erste! Du bist die einzige. Du bist unsere Liebe! Du läutest Sommer, schönen Sommer über Land und Stadt. All der Schnee wird schmelzen! Die kalten Winde werden weggejagt! Wir werden herrschen! Alles wird grün werden! Und dann wirst du die Gesellschaft anderer Blumen haben; aber du bist die erste, so fein, so zart!"

zart = tender, *läuten* = proclaim, *herrschen* = prevail

7 Translate into German: *a*) Yesterday it rained all day, *b*) This is the second book that I have lost, *c*) Father says we must not go into the forest, *d*) If she had been here she would have gone with you, *e*) Where is your sister's pretty white rose?

8 Conjugate the present indicative active of *graben*, the imperfect indicative active of *fangen*, the present subjunctive active of *geniefsen*, the perfect subjunctive passive of *sehen*. Write the active infinitives and participles of *brechen*.

9 Mention *two* suffixes that form feminine nouns, *two* suffixes that form masculine nouns, *one* suffix that forms neuter nouns. Give an illustration of each.

10 Decline, in singular and plural, *sein treuer Freund*, *die kleine Stadt*.

11 Write the principal parts of *beginnen*, *ausmachen*, *sitzen*, *thun*, *wissen*.

12 Write a synopsis of *kommen* in the third person singular.

13 Translate into German: *a*) I can not help it, *b*) He went early in the morning, *c*) She is not at home, *d*) I have been here an hour, *e*) Where do you come from?

14 Write original German sentences of at least *six* words each, containing *a*) an adjective in the comparative degree, *b*) an interrogative pronoun, *c*) a present participle, *d*) a subordinating conjunction, *e*) an adverbial conjunction.

15 Write from memory and translate at least 10 consecutive lines from *one* of the following: *Heidenröslein*, *Das Schlofs am Meere*, *Die Lorelei*, *Sinnsprüche*.

High School Department

169TH EXAMINATION

GERMAN — First Year

Tuesday, June 18, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

HAGEN

Da sagten die drei Mädchen: "Wenn du grofs wirst, kannst du gewifs den Weg wieder zu ihnen finden. Jetzt aber ist es wohl am besten, du bleibst noch bei uns, und wir alle wollen dich lieb haben." Und nun sorgten sie für den Prinzen. Wenn sie ausgingen, um Wurzeln zur Speise zu suchen, so ging er mit. Das thaten sie Tag um Tag eine lange, lange Zeit, bis der Knabe grofs und kräftig geworden war, dann aber ging er allein ohne die Mädchen aus der Höhle heraus hinein in den Wald und noch weiter an die See und machte sich einen Bogen, um Vögel zu schiefsen.

sorgen=care, *Wurzel*=root, *Speise*=food, *Bogen*=bow

3–4 Translate into English:

DER WUNSCHRING

Doch die Frau wufste gleich guten Rat. "Was meinst du," sagte sie, "wenn wir uns noch etwas Acker wünschten? Wir haben gar so wenig. Da reicht so ein Zwickel gerade zwischen unsre Äcker hinein; den wollen wir uns wünschen."

"Das wäre der Mühe wert," erwiderte der Mann. "Wenn wir ein Jahr lang tüchtig arbeiten und etwas Glück haben, können wir ihn uns vielleicht kaufen." Darauf arbeiteten Mann und Frau ein Jahr lang mit aller Anstrengung, und bei der Ernte hatte es noch nie so geschüttet wie dieses Mal, so dafs sie sich den Zwickel kaufen konnten und noch ein Stück Geld übrig blieb. "Siehst du!" sagte der Mann, "wir haben den Zwickel, und der Wunsch ist immer noch frei."—*Leander*

Acker = cultivated field, *Zwickel* = wedge, *Ernte* = harvest, *schütten* = yield

5–6 Translate into English:

LOHERANGRIN

Einst war Parcival im herrlichen Saale des Gral mit seinen Rittern versammelt, da erschienen am Becher die Worte "Loherangrin, Parcivals Sohn, ziehe nach Brabant, und hilf der Her-

zogstochter Elsa aus der Not!" Da kam Loherangrin aus der Reihen der Ritter und trat vor den königlichen Vater und sprach: "Siehe, ich bin bereit," und da reichte ihm Parcival ein Schwert und sprach: "Gehe in Frieden, mein Sohn, und erfülle die Pflicht!" Und Loherangrin verliefs die Burg und eilte zur See und stieg in ein Boot. Das wurde von Schwänen über die See bis an die Mündung des Rheins gezogen, dort lenkte es ein und fuhr südlich weiter, bis es Brabant erreichte, da hielt es an, und Loherangrin stieg aus.

Gral = grail, *Pflicht* = duty, *Mündung* = mouth, *einlenken* = turn

7 Translate into German:

a Let us follow the little children.

b Friday will be the longest day in the year.

c There are many soldiers in the city.

d You must go at once to school.

e He should have come three days ago.

8 Conjugate the imperfect indicative of *werden*, the future perfect indicative of *kommen*, the imperfect subjunctive active of *raten*, the present conditional passive of *schelten*, the perfect subjunctive passive of *rufen*.

9 Indicate the gender of each of *five* of the following nouns, giving the rule in each case: *Leben*, *Freundschaft*, *Freundin*, *Schonheit*, *Frühling*, *Fräulein*, *Hoffnung*, *Tochterchen*, *Reiter*.

10 Decline in singular and plural *das hohe Schlofs*, *welcher Mann*.

11 Write the principal parts of *brechen*, *vergeben*, *mitnehmen*, *saufen*, *ziehen*.

12 Compare *hoch*, *kurz*, *wohl*. Write the second and the third person singular of the present indicative of *loschen*, *schlafen*.

13 Translate into English: *a*) Ich bitte um Verzeihung, *b*) Das freut mich sehr, *c*) Ich kann nichts dafür, *d*) Wir waren nur ein paar Tage in der Stadt, *e*) Wir sind nur ein paar Tage in der Stadt.

14 Translate into German: *a*) My sister is taller than I, *b*) Perhaps you have not understood, *c*) Do not wait for me, *d*) I told him that it was very late, *e*) Would you like to go home with him?

15 Write from memory and translate 10 consecutive lines of one of the following poems: *Die Lorelei*, *O Strafsburg*, *Heidenröslein*, *Der gute Kamerad*.

High School Department

165TH EXAMINATION

GERMAN — Second Year

August 1900 — Three hours, only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

BULEMANN'S HAUS

Schon verschwand der Tag, und die Dunkelheit kroch in alle Ecken. Tief unten von der Gasse herauf hörte er Gesang; Knaben und Mädchen zogen von Haus zu Haus und sangen Weihnachtslieder. Sie gingen in alle Thüren; er stand und horchte. Kam denn niemand in seine Thür? — — Aber er wufste es ja, er hatte sie selber alle fortgetrieben; es klopfte niemand, es rüttelte niemand an der verschlossenen Hausthür. Sie zogen vorüber, und allmählich ward es still, totenstill auf der Gasse Und wieder suchte er zu entrinnen; er wollte Gewalt anwenden; er rang mit den Tieren, er liefs sich Gesicht und Hände blutig reifsen. — *Storm*

allmählich = gradually, *anwenden* = use

3–4 Translate into English:

DER FLUCH DER SCHÖNHEIT

Lag er nun so auf dem Bette und zählte die langen Stunden, doppelt lang durch Pein und Ungeduld, dann war es oft sein einziges Labsal, an die Vaterstadt zurückzudenken, ja gange Tage in Weilburg umher zu wandeln und alle alten Freunde zu begrüfsen. Nur selten hatte er während seiner Kriegsfahrten Kunde von den Eltern erhalten und in der letzten Zeit gar nicht mehr; denn auf einen Briefwechsel war da nicht zu zählen, sondern nur auf mündliche Nachricht, wie sie von den durchmarschierenden Söldnerscharen herüber und hinüber gebracht wurde. Der friedliche Verkehr hatte in diesen Tagen der äufsersten Not und Gewaltthat fast gänzlich aufgehört.

— *Riehl*

Labsal = comfort, *Söldnerschar* = band of mercenaries

5-6 Translate into English:

WILHELM TELL

Melchthal — Da weint' ich nicht! Nicht in ohnmächt'gen Thränen
Gofs ich die Kraft des heifsen Schmerzens aus,
In tiefer Brust, wie einen teuren Schatz,
Verschlofs ich ihn und dachte nur auf Thaten.
Ich kroch durch alle Krümmen des Gebirgs,
Kein Thal war so versteckt, ich späht' es aus;
Bis an der Gletscher eisbedeckten Fufs
Erwartet' ich und fand bewohnte Hütten,
Und überall, wohin mein Fufs mich trug,
Fand ich den gleichen Hafs der Tyrannei.—*Schiller*

7 Translate into German: *a*) A few steps before them stood a large tree covered with flowers, *b*) While the horses were drinking, the boy ran away, *c*) She introduced me to her mother and brother, *d*) Soon afterward I met my sister coming back, *e*) I dare not think of letting you go.

8 Conjugate the present indicative active of ***schelten***, the perfect indicative active of ***bleiben***, the imperfect subjunctive active of ***bitten***, the present (first) conditional passive of ***lieben*** Give all the active participles and infinitives of ***sehen***.

9 Translate into English: *a*) Mir soll es nicht darauf ankommen, *b*) Sie sind mir nie zur Last, *c*) Ihr sollt mir Rede stehen, *d*) Es mufs nun einmal so sein, *e*) Was ist zu Ihrem Befehle?

10 Write the principal parts of ***aushören***, ***graben***, ***lügen***, ***stechen***, ***verloschen***.

11 Distinguish between the strong and the weak declension of nouns. Decline *two* nouns belonging to each declension.

12 Translate into German: *a*) I prefer milk to tea, *b*) Not very much will fall to your share, *c*) He was killed at the battle of Waterloo, *d*) I feel dizzy and we are not yet half way up, *e*) I heard him say he was ready to fight.

13 Mention *three* ways in which adverbs are derived; *two* ways in which adjectives are derived. Illustrate each.

14 Mention *three* separable prefixes, *two* inseparable prefixes, *two* prefixes which may be separable or inseparable. Illustrate each class in an original German sentence.

15 Write from memory and translate 10 consecutive lines of any German poem.

High School Department

166TH EXAMINATION

GERMAN — Second Year

'ednesday, September 26, 1900—9.15 a.m. to 12.15 p.m., only

4nswer questions 7 and 8 and eight of the others but **no more.** *If re than eight of the others are answered only the first eight answers ll be considered. Division of groups is not allowed. Each complete swer will receive 10 credits. Papers entitled to 75 or more credits ll be accepted.*

1–2 Translate into English:

DIE WANDELNDE GLOCKE

Die beiden Herren, welche augenscheinlich Gefallen aneinder fanden, unterhielten sich noch eine geraume Zeit, tranken, ; ihr Schoppen leer war, noch eine gemeinsame feinere Flasche ıd gelangten erst um halb zwölf zu Bette.

Dennoch waren sie am andern Morgen zeitig munter, der ɔktor aus Grundsatz und Gewohnheit, der Bürgermeister aus ırgeiz, er wollte sich von dem jüngern Manne nicht beschämen ssen. Die Köchin blieb auch nicht zurück; ein Viertel vor chs war das Frühstück bereit, das beide Gäste sich gut hmecken liefsen. Mit dem Glockenschlage erhoben sie sich ıd schauten nach dem Wagen aus. Vergeblich. Jeden Augenick zog der Doktor seine Uhr. "Fünf Minuten!" brummte er.

—*Fischer*

augenscheinlich = evidently, *Ehrgeiz* = ambition

3–4 Translate into English:

HÖHER ALS DIE KIRCHE

Da stand der arme Hans wie vom Donner gerührt, alle seine offnungen waren mit einem Schlage zertrümmert. Und als ; wieder still und leer war auf dem Platz, setzte er sich auf e Bank, lehnte die Stirn in ausbrechendem Schmerz an das hlanke Stämmchen des Rosenbaumes und schluchzte laut: O mein Kaiser, mein lieber guter Kaiser, warum bist du mir ɛstorben!" Da legte sich leise eine Hand auf seine Schulter, aili stand neben ihm. Es dunkelte, und nur vom Wasseriegel des Rheins herauf schimmerte noch ein matter Wiederhein der letzten Lichtstrahlen. Es hatte ausgeläutet, die ıerne Totenklage war verklungen und es war so still und ısgestorben ringsum in der Natur, als könne es nie wieder ·ühling werden.—*Wilhelmine von Hillern*

5–6 Translate into English:

BILDERBUCH OHNE BILDER

"Es herrschte Windstille," sagte der Mond, "das Wasser war rchsichtig, wie die reinste Luft, durch welche ich schwebte, f unter dem Meeresspiegel konnte ich die seltsamen Pflanzen ›licken, die wie riesenhafte Bäume des Waldes ihre klafter-

langen Arme gegen mich erhoben; die Fische schwammen über ihre Gipfel hinweg. Hoch in der Luft zog ein Schwarm wilder Schwäne, einer davon sank mit ermatteten Flügeln tiefer und tiefer, seine Augen folgten der luftigen Karawane, die sich mehr und mehr entfernte; weit ausgebreitet hielt er die Flügel und sank, wie die Seifenblase sinkt in der stillen Luft, er berührte die Wasserfläche, sein Kopf bog sich zurück zwischen die Flügel, ruhig lag er da, gleich der weifsen Lotosblume auf dem stillen Landsee."—*Andersen*

Klafter = fathom, *Blase* = bubble, *Fläche* = surface

7 Translate into German: *a*) They were laughing about my going to the country, *b*) He had to leave without saying good-by, *c*) The more I walk, the better I feel, *d*) We are very anxious about the soldiers, *e*) What else could be expected?

8 Conjugate the present indicative active of *lacheln*, the pluperfect indicative active of *folgen*, the present subjunctive of *sich ruhmen*, the imperative of *kommen*, the imperfect subjunctive active of *essen*.

9 Write the principal parts of *enthalten*, *raten*, *treffen*, *verlegen*, *wachsen*.

10 Translate into German: *a*) Many of the Germans believed they had lost their best friend in the death of Frederick the Great, *b*) The fatherland was dearer to Körner than his fame as a poet, *c*) His last words to his son were "Learn to suffer without complaint."

11 Give the synopsis of *trinken* in the third person singular of the indicative and subjunctive active. Write the second and the third person singular of the present indicative active of *brechen*, *fallen*, *mogen*, *lesen*.

12 Write original German sentences containing *a*) a predicate nominative, *b*) an adverbial genitive, *c*) a dative of interest, *d*) an accusative absolute, *e*) a cognate accusative.

13 Translate into English: *a*) Die Sache hat viel für sich, *b*) Hier mufste eine böse Hand im Spiele sein, *c*) Ich verstehe nicht was sich in der Welt schicke, *d*) Es geht auf Leib und Leben, *e*) Um Antwort wird gebeten.

14 Write original German sentences of at least *six* words each containing the following verbs: *achten*, *durfen*, *gehören*, *geschehen*, *sich schämen*.

15 Write from memory and translate 10 consecutive lines of any German poem.

High School Department

167TH EXAMINATION

GERMAN — Second Year

Monday, January 21, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

KRAMBAMBULI

Zwei Jahre waren so vergangen, da erschien eines Tages die Gräfin, die Frau seines Brotherrn, im Hause des Jägers. Er wufste gleich, was der Besuch zu bedeuten hatte, und als die gute, schöne Dame begann: "Morgen, lieber Hopp, ist der Geburtstag des Grafen" . . . setzte er ruhig und schmunzelnd fort: "Und da möchten Hochgräfliche Gnaden dem Herrn Grafen ein Geschenk machen, und sind überzeugt, mit keinem so viel Ehre einlegen zu können, als mit dem Hunde Krambambuli."—"Ja, ja, lieber Hopp" . . . Die Gräfin errötete vor Vergnügen über dieses freundliche Entgegenkommen und sprach gleich von Dankbarkeit und bat, den Preis nur zu nennen, der für den Hund zu entrichten wäre.—*Ebner-Eschenbach*

Brotherr=employer, *schmunzeln*=smile

3–4 Translate into English:

SPHINX

Mein Lieber! Du wirst erstaunt sein, einen Brief von mir zu erhalten. Trotzdem uns von Kindheit auf eine innige Freundschaft verbindet, wird man nach unserem Tode keinen zwischen uns gepflogenen Briefwechsel zum Herausgeben finden. Wir stimmen auch darin überein, dafs die Postkarte eine der glücklichsten Erfindungen der Neuzeit ist. Sie erfüllt ihren Zweck und—verpflichtet zu nichts. An den gebildeten Briefschreiber stellt man alle möglichen Anforderungen, niemand aber wird auf einer Postkarte schöne Worte, schöne Sätze, geistreiche Gedanken erwarten.—*Peschkau*

übereinstimmen = agree, *Zweck* = purpose

5–6 Translate into English:

WILHELM TELL

Stauffacher—Frau, welchen Sturm gefährlicher Gedanken
Weckst du mir in der stillen Brust! Mein Innerstes
Kehrst du ans Licht des Tages mir entgegen,
Und was ich mir zu denken still verbot,
Du sprichst's mit leichter Zunge kecklich aus.
—Hast du auch wohl bedacht, was du mir rätst?

Die wilde Zwietracht und den Klang der Waffen
Rufst du in dieses friedgewohnte Thal—
Wir wagten es, ein schwaches Volk der Hirten,
In Kampf zu gehen mit dem Herrn der Welt?—*Schiller*
Zwietracht = discord

7 Translate into German: *a*) It will be time to go when the train comes, *b*) They promised to send the flowers today, *c*) Without waiting for me to reply he went away, *d*) Bring me a book containing nothing but poems, *e*) Why did you not remain standing when I entered?

8 Conjugate, in the active voice, the present indicative of *befehlen*, the future perfect indicative of *thun*, the imperfect subjunctive of *ausnehmen;* in the passive voice, the pluperfect indicative of *finden*, the present subjunctive of *strafen*.

9 Write the principal parts of *empfinden*, *fliefsen*, *nachdenken*, *streiten*, *zwingen*.

10 Translate into English: *a*) Etwas ward ihm unheimlich zu Mut, *b*) Er legte Fürsprache ein bei meinem Bruder, *c*) Sie sollten nicht so blind ins Zeug gegangen sein, *d*) Das wird blofs bei gemeinen Seelen zur Wahrheit, *e*) Warum durfte mir solches Glück nicht auch zu teil werden?

11 Mention *three* uses of the genitive, *two* uses of the dative. Illustrate each by an original German sentence, containing at least *six* words.

12 Translate into German: *a*) He was obliged to come though he did not wish to do so, *b*) He appears not to have thought of that at all, *c*) They took care not to remain, *d*, *e*) Yesterday I received a letter from my cousin in which he begged me to come at once.

13 Account for the mode of each italicized verb in the following sentences: *a*) Er sagt dafs er recht *habe*, *b*) Das *wäre* leicht zu *verstehen*, *c*) Wenn Sie mich *rufen* hören, *warten* Sie auf mich.

14 Explain what is meant by *a*) normal order, *b*) inverted order, *c*) dependent order. Illustrate each by an original German sentence.

15 Write from memory and translate 15 consecutive lines of any poem in the memory selections required for second year German.

High School Department

169TH EXAMINATION

GERMAN—Second Year

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

FREUND LIPP

Ich war in mein fünfzehntes Jahr eingetreten, las Virgil und Xenophon und konnte die Ursachen, welche das römische Weltreich zu Fall gebracht hatten, an den Fingern herzählen. Doch verlor ich über den klassischen Studien mein eigentliches Lebensziel, die dramatische Kunst, nicht aus dem Auge, und da mir seit jenem Debut die Bühne verschlossen war, so studirte ich in meinem Zimmer die Rollen ein, in denen ich später zu glänzen hoffte. Auch hatte ich mich bereits als dramatischer Schriftsteller versucht, und in meinem Schreibpult verborgen lag eine vollendete Tragödie. Sie war betitelt "Pharao." In derselben kamen die sieben ägyptischen Plagen und die Wunder Mosis vor, den Schlufs aber, von dem ich mir den glänzendsten Erfolg versprach, bildete Pharao's Untergang im roten Meer.

Bühne=stage, *Schreibpult*=writing-desk

3–4 Translate into English:

BILDERBUCH OHNE BILDER

"Es war gestern in der Morgendämmerung," dieses sind des Mondes Worte, "noch rauchte kein Schornstein in der grofsen Stadt, und die Schornsteine waren es gerade, die ich betrachtete. In diesem Augenblick kroch aus einem derselben ein kleiner Kopf heraus, und dann der halbe Körper, die Arme ruhten auf dem Rande des Schornsteins. "Hiob! Hiob!" Es war ein kleiner Schornsteinfegerjunge, der zum ersten Mal in seinem Leben durch einen Schornstein gekrochen war und den Kopf darüber herausgesteckt hatte. "Hiob! Hiob!" Ja das war freilich etwas Anderes, als in den dunklen und engen Kaminen herumzukriechen! Die Luft wehte so frisch, er konnte über die ganze Stadt hinweg nach dem grünen Walde sehen.—*Andersen*

Schornstein=chimney, *Feger*=sweeper, *Kamin*=chimney

5–6 Translate into English:

HERMANN UND DOROTHEA

Ernsthaft sagte der Sohn: Ihr irret, Mutter. Ein Tag ist
icht dem anderen gleich. Der Jüngling reifet zum Manne;
esser im stillen reift er zur That oft, als im Geräusche
ilden, schwankenden Lebens, das manchen Jüngling verderbt
hat.
nd so still ich auch bin und war, so hat in der Brust mir
ch sich gebildet ein Herz, das Unrecht hasset und Unbill,
d ich verstehe recht gut, die weltlichen Dinge zu sondern;
ch hat die Arbeit den Arm und die Füſse mächtig gestärket.
es, fühl ich, ist wahr; ich darf es kühnlich behaupten.

—*Goethe*

hwankend=unsettled, *sondern*=distinguish

Translate into German: *a*) For my sake be careful, *b*) He
d and died an honest man, *c*) Had you come earlier, he
ld have met you, *d*) To turn back was impossible; we had
e too far for that, *e*) Many people were assembled in the inn.

Conjugate the present indicative of *lächeln*, the imperfect
junctive of *sterben*, the imperfect indicative, active and pas-
, of *bringen*, the pluperfect indicative passive of *verlieren*.

Write the synopsis of *brechen* in the third person singular
e indicative and subjunctive active. Mention in each case
name of the tense.

Write the principal parts of *ausgehen*, *essen*, *besitzen*,
gen, *schwinden*.

Translate into English: *a*) Es geht mir nahe, *b*) Er darf
sprechen, *c*) Er hat keinen Nutzen davon, *d*) So viel an
ist, *e*) Was treiben Sie in der letzten Zeit?

Select from questions 1–6 a strong verb and a weak verb.
ng these verbs to illustrate the general rule, explain the
nation of the imperfect indicative and the imperfect sub-
ctive of *a*) strong verbs, *b*) weak verbs.

3 Mention *three* verbs that are followed by the dative, *two*
s that are followed by the genitive. Illustrate each by an
inal German sentence containing at least *six* words.

4 Write and translate original German sentences containing
following words: *erst*, *doch*, *sogar*, *desto*, *herein*.

5 Write from memory and translate 10 consecutive lines of
of the following poems: *Scheiden*, *Erlkönig*, *Die Wacht am*
in, *Der Handschuh*.

High School Department

167TH EXAMINATION

GERMAN—Third Year

Monday, January 21, 1901—1.15 to 4.15 p. m., only

Answer question 7 and nine of the others but **no more.** *If more than ne of the others are answered only the first nine answers will be con- 'ered. Division of groups is not allowed. Each complete answer ll receive 10 credits. Papers entitled to 75 or more credits will be cepted.*

1–2 Translate into English:

DIE JUNGFRAU VON ORLEANS

rel—Lafs mich! Es ist der Freude Drang, der mich
Zu deinen Füfsen niederwirft.—Ich mufs
Mein überwallend Herz vor Gott ergiefsen,
Den Unsichtbaren bet' ich an in dir.
Du bist der Engel, der mir meinen Herrn
Nach Reims geführt und mit der Krone schmückt.
Was ich zu sehen nie geträumt, es ist
Erfüllt! Der Krönungszug bereitet sich,
Der König steht im festlichen Ornat,
Versammelt sind die Pairs, die Mächtigen
Der Krone, die Insignien zu tragen,
Zur Kathedrale wallend strömt das Volk,
Es schallt der Reigen, und die Glocken tönen,
O, dieses Glückes Fülle trag' ich nicht!—*Schiller*

3–4 Translate into English:

NATHAN DER WEISE

athan—Ihr, guter Bruder, müfst mein Fürsprach sein,
Wenn Hafs und Gleisnerei sich gegen mich
Erheben sollten—wegen einer That—
Ah, wegen einer That!—Nur Ihr, Ihr sollt
Sie wissen!—Nehmt sie aber mit ins Grab!
Noch hat mich nie die Eitelkeit versucht,
Sie jemand Anderm zu erzählen. Euch
Allein erzähl' ich sie. Der frommen Einfalt
Allein erzähl' ich sie. Weil die allein
Versteht, was sich der gottergebne Mensch
Für Thaten abgewinnen kann.—*Lessing*

Gleisnerei = hypocrisy

5–6 Translate into English:

IPHIGENIE AUF TAURIS

est—Es ist der Weg des Todes, den wir treten:
Mit jedem Schritt wird meine Seele stiller.
Als ich Apollen bat, das gräfsliche
eleit der Rachegeister von der Seite
Iir abzunehmen, schien er Hülf' und Rettung
n Tempel seiner vielgeliebten Schwester,

Die über Tauris herrscht, mit hoffnungsreichen,
Gewissen Götterworten zu versprechen;
Und nun erfüllet sich's, dafs alle Not
Mit meinem Leben völlig enden soll.
Wie leicht wird's mir, dem eine Götterhand
Das Herz zusammendrückt, den Sinn betäubt,
Dem schönen Licht der Sonne zu entsagen.—*Goethe*

Rachegeist = avenging spirit

7 Translate into German: What was the private life of Shakspere? In spite of all investigations we have been able to discover almost nothing about it. Foolish legends of all sorts concerning the youth of this great poet have been spread abroad. These legends can not be proved and should not be believed.

8 Translate into English: *a*) Es ist nichts böse daran, *b*) Er war lange nicht zu Wort gekommen, *c*) Zwischen ihm und mir geht es immer ganz ehrlich und offen zu, *d*) Wenn Sie noch mitten darin säfsen, *e*) Er pflegt mit seinem Bruder Rat, *f*) Er mag sich nur in Acht nehmen, *g*) Nichts anders blieb ihm übrig als fortzugehen, *h*) Endlich kam er zu Atem wieder, *i*) Wir sind sehr schlimm daran, *j*) Um Wahrheit ist es mir zu thun.

9 Write in German about 75 words on the poetry of Heine *or* of Uhland.

10 Mention *five* verbs that are followed *either* by the genitive *or* by a preposition and the accusative. Illustrate by original German sentences.

11 Write in German about 75 words on the life and works of Goethe *or* of Rückert.

12 Translate into German: *a*) pale with anger, *b*) sick at heart, *c*) anxious about work, *d*) eager for wealth, *e*) rich in friends, *f*) sensitive to praise, *g*) capable of learning, *h*) ashamed of idleness, *i*) angry at the result, *j*) proud of one's beauty.

13 Mention the authors of 10 of the following: *Wallenstein*, *Minna von Barnhelm*, *Hermann und Dorothea*, *Die Journalisten*, *Gebet während der Schlacht*, *Das kalte Herz*, *Die wandelnde Glocke*, *Immensee*, *Höher als die Kirche*, *Scheiden*, *Aus meiner Welt*, *Barbarossa*, *Brigitta*, *Der Fluch der Schönheit*, *Die Wacht am Rhein*.

14 Translate into German: When Cortez returned to Spain he was coolly received by Charles the Fifth. One day he presented himself unexpectedly before the king. "Who are you?" asked the king haughtily. Just as proudly Cortez replied, "I am the man who has given you more provinces than your ancestors left you cities."

15 Write from memory and translate 15 consecutive lines of any poem in the memory selections required for third year German.

High School Department

169TH EXAMINATION

GERMAN—Third Year

Monday, June 17, 1901—1.15 to 4.15 p. m., only

Answer question 7 and nine of the others but **no more.** *If more than ne of the others are answered only the first nine answers will be con-lered. Division of groups is not allowed. Each complete answer 'll receive 10 credits. Papers entitled to 75 or more credits will be cepted.*

1–2 Translate into English:

WALLENSTEIN

Und weil sich's nun einmal so gemacht,
Dafs das Glück dem Soldaten lacht,
Lafst's uns mit beiden Händen fassen,
Lang werden sie's uns nicht so treiben lassen.
Der Friede wird kommen über Nacht,
Der dem Wesen ein Ende macht;
Der Soldat zäumt ab, der Bauer spannt ein,
Eh man's denkt, wird's wieder das Alte sein.
Jetzt sind wir noch beisammen im Land,
Wir haben's Heft noch in der Hand.
Lassen wir uns auseinander sprengen,
Werden sie uns den Brodkorb höher hängen.—*Schiller*

3–4 Translate into English:

NATHAN DER WEISE

Recha— Ich will
Ja zu den Füfsen dieses stolzen Mannes
Nur Gott noch einmal danken, nicht dem Manne.
Der Mann will keinen Dank, will ihn so wenig,
Als ihn der Wassereimer will, der bei
Dem Löschen so geschäftig sich erwiesen.
Der liefs sich füllen, liefs sich leeren mir
Nichts, dir nichts: also auch der Mann. Auch der
Ward nur so in die Glut hineingestofsen;
Da fiel ich ungefähr ihm in den Arm;
Da blieb ich ungefähr, so wie ein Funken
Auf seinem Mantel, ihm in seinen Armen,
Bis wiederum, ich weifs nicht was, uns beide
Herausschmifs aus der Glut.—*Lessing*

5–6 Translate into English:

DIE VERLORENE HANDSCHRIFT

'Doch nicht um die Prinzefs handelt es sich. Die Zeit ist :ommen, wo über die nächsten Jahre des Erbprinzen ein tschlufs gefafst werden mufs. Ich habe daran gedacht, ihn

trotz der Bedenken, welche seine zarte Gesundheit nahe legt, in eine gröfsere Armee eintreten zu lassen. Sie wissen, dafs dies uns nur in einem Staate möglich ist. Auch dort hat sich eine unerwartete Schwierigkeit gefunden. Es sind dort zwei Regimenter, welche Sicherheit gewähren, dafs der Prinz nur mit Offizieren von Familie in ein kameradschaftliches Verhältnis treten würde. Aber das eine Regiment hat jetzt zum Commandeur denselben Kobell erhalten, der vor Jahren unsern Dienst quittiert hat; es ist unthunlich, den Prinzen zu seinem Untergebenen zu machen."—*Freytag*

7 Translate into German: Oliver Cromwell was not without book-learning. He had spent some time at a college at Cambridge, but this was without special influence on him. The first serious mental awakening that we notice in him, was a result of the teaching of stern puritanism preached, at that time, by a lecturer named Beard.

8 Write and translate German idioms containing *five* of the following verbs: *gehen*, *thun*, *gelten*, *kommen*, *brechen*, *mögen*, *sein*.

9 Write in German about 75 words on the life and literary work of Lessing *or* of Freytag.

10 Mention *three* uses of the subjunctive in principal clauses; *two* uses of the infinitive. Illustrate *each* by an original German sentence containing at least *six* words.

11 Translate into English: *a*) zum Teil, *b*) alle paar Minuten, *c*) dem Alter nach, *d*) bei uns zu Lande, *e*) beizeiten, *f*) gegen drei Monate, *g*) auf eigene Hand, *h*) so für mich hin, *i*) von ganzem Herzen, *j*) mit der Zeit.

12 Write in German prose an abstract of *one* of the poems of Heine *or* of Goethe.

13 Explain the difference in meaning of each of *three* of the following contrasted expressions: *a*) *denken an* and *denken zu*, *b*) *sterben an* and *sterben auf*, *c*) *sich bekümmern über* and *sich bekümmern um*, *d*) *böse auf* and *böse über*, *e*) *reichen an* and *reichen zu*.

14 Translate into German: A German, the guest of an Englishman, accidentally broke a glass. The Englishman asked him if that was the custom in Germany. "No indeed," calmly replied the German, "but if it does happen, no one asks any questions about it."

15 Write from memory and translate 10 consecutive lines of *one* of the following poems: *Belsazar*, *Reiters Morgengesang*, *Der Fischer*, *Mignon*.

High School Department

167TH EXAMINATION

SPANISH—First Year

ıy, January 22, 1901—1.15 to 4.15 p. m., only

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estions 7 and 8 and eight of the others but **no more.** *If ht of the others are answered only the first eight answers ered. Division of groups is not allowed. Each complete receive 10 credits. Papers entitled to 75 or more credits 'ed.*

ılate into English:

FERNANDO DE SOTO

le recorrer el país dos ó tres años buscando infruc- minas de oro, descubrió el río Mississippí. A las ıas murió, y fué sepultado á media noche en las uel caudaloso río.

dos sus compañeros por la pérdida de su temerario n de reunirse á sus compatriotas en Méjico, encon- ıos peligros en su viaje de vuelta, y padecieron ade- : y muchas enfermedades. Escasamente la mitad lieron llegar á su destino. La tentativa de con- Florida había fracasado nuevamente, no quedando añol en aquella parte del país.

=mighty, *tratar*=resolve, *fracasar*=fail

ılate into English:

LOS BOSQUES DE SUD AMÉRICA

nterminables bóvedas y entre estos miles de colum- hermosas plantas parásitas que vienen á ser las ıdelabros de este colosal santuario. Todo allí es crece silvestre el cacao; por todos lados nos rodean nadas maderas, bajo la planta del viajero hay pie- as y ricos metales. Selvas hay allí donde jamás el có su huella. Aquello es un campo inmenso para eta, para la paleta del pintor, para las exploraciones para los estudios de la zoología, de la botánica, y logía, y, más que todo, para convencer al escéptico cia de Dios.

rest, *bóveda*=arch, *araña*=chandelier, *silvestre*= =trace

late into English:

EL VIUDO

ɔr, recién casado, se estableció en un pueblo, donde ɜ la estimación de todos los vecinos. Al cabo de

un año, tuvo la desgracia de que se le muriese una vaca, y poco después quedó viudo. Estaba inconsolable, y algunos vecinos le aconsejaban á que se resignase, diciéndole uno: es verdad que la pérdida de su esposa de V. es casi irreparable; pero V. es aún joven, y así puede elegir cualquiera de mis tres hijas.—Otro le ofrecía su hermana, otro su sobrina; y el pobre viudo, viéndose tan favorecido, no pudo menos de exclamar: veo que en este país vale más perder la mujer que la vaca. Apenas he enviudado, ya me ofrecen cinco mujeres; pero cuando se me murió la vaca, nadie vino á ofrecerme una.

lograr=succeed, *aconsejar*=advise, *elegir*=choose

7 Translate into Spanish: *a*) The little boys and girls love their father and mother, *b*) I have been hungry for three days, *c*) He is going to send his daughters to study in Madrid, *d*) The old man has more than three hundred dollars, *e*) He used to walk to the theater every night.

8 Conjugate *partir* in the imperfect indicative active, *tomar* in the future conditional active, *dormir* in the future subjunctive, *abrir* in the pluperfect indicative active.

9 Indicate, by the use of the proper article, the gender of *dolor*, *servidumbre*, *nación*, *árbol*, *poema*, *mano*, *verdad*, *día*, *reloj*, *flor*.

10 Translate into Spanish: *a*) We live in a very large house near you, *b*) Another time he went away without saying a word, *c*) When he came to see me I gave them to him, *d*) The whole city fears him, *e*) What time is it? It is three o'clock.

11 Write the third person singular of the preterit (past definite or aorist) indicative of *estar*, *andar*, *ir;* the present infinitive active of *haga*, *pidió*, *oiga*, *suena*; the third person singular of the present subjunctive active of *temer*, *tener*, *ver*.

12 Write the comparative of *pequeño*, *bueno*, *alto*, *lejos*, *mal*, *blanco*. Give the rule for the comparison of adjectives. State, with illustration, what is meant by the absolute superlative.

13 Translate into English: *a*) Tiene miedo, *b*) Vino á morir, *c*) Me duele la cabeza, *d*) No es del caso, *e*) Deja que hablen, *f*) Echó mano, *g*) Me gusta poco, *h*) Se me figura, *i*) Volviendo á entrar, *j*) A ver.

14 Write all the possessive pronouns.

15 Write from memory and translate at least 10 consecutive lines of any Spanish poem.

High School Department

169TH EXAMINATION

SPANISH—First Year

Tuesday, June 18, 1901—1.15 to 4.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If* *ore than eight of the others are answered only the first eight answers* *vill be considered. Division of groups is not allowed. Each complete* *nswer will receive 10 credits. Papers entitled to 75 or more credits* *vill be accepted.*

1–2 Translate into English:

LA ALTA MAR

Estaban en alta mar, y buscó en vano con la vista las costas le su patria. Olas y olas eslabonadas interminablemente, he quí lo único que distinguieron sus ojos. Hacía un día magífico. La luz, el aire y el agua, confundiéndose amorosanente, componían aquel cuadro grandioso, donde no había nontañas, ni selvas, ni ríos, ni nubes . . . nada que limitase i dividiera la distancia. El cielo y el océano, las dos majesades de la inmensidad, se miraban en silencio y como asomradas de su poder, de su grandeza, de su extensión. Aquella oledad era sublime. Perdíanse en ella la vista y el pensaiento.

eslabonar=join, *asombrar*=awe

3–4 Translate into English:

CÁDIZ

Hombres hay que por su carrera y particulares circunstanas tienen más ocasión que otros para ver las miserias y desracias de la humanidad; tales son el médico y el sacerdote. e la misma suerte existen ciudades que por su posición topoáfica y otras causas diversas parecen designadas por la natuleza para ser testigos de grandes tribulaciones, de dolorosos ontecimientos. A este número pertenecen las poblaciones arítimas, y entre ellas Cádiz. Centinela avanzada de Europa los mares del mediodía, centro en otro tiempo de la contraión y riquezas del antiguo y nuevo mundo, duerme hoy enelta en los restos de su dorado manto, como si quisiera olvidar memorias de su pasada grandeza.

contecimiento=event, *mediodía*=south, *contratación*=trade

5–6 Translate into English:

LA INGRATITUD

El reconocimiento es un deber, y es grande ignominia á él. No hay ley alguna para castigar la ingratitud: lo guos la ponían en el número de aquellos delitos horribl los que era necesario dejar la venganza á los dioses: que los remordimientos que la siguen, y la vergüenza acompaña eran también en esta vida el justo castigo. U sofo, á quien su discípulo quería ridiculizar, diciéndole, parecía á un animal, replicó á este insolente: Yo no sé parezco al animal que me nombráis; pero sé bien, y t mundo convendrá conmigo en que vos os parecéis á un in que es el más despreciable y aborrecible de todos los an

reconocimiento=gratitude, *vergüenza*=shame

7 Translate into Spanish: *a*) As it is very late I sha the pleasure of going home with you, *b*) When your falls do not rejoice, *c*) It is cold outside, *d*) He desired t children should not suffer, *e*) At what time do you set o

8 Conjugate *alegrarse* in the present indicative, *habla* future indicative active, *oir* in the present subjunctive

9 Explain the difference between *de* and *dé*, *el* and *é* and *luégo*, *cuanto* and *cuánto*, *aun* and *aún*.

10 Translate into English: *a*) Más valiera algo qu *b*) Apareció al cabo, *c*) Se puso de pie, *d*) Déjale que ve Avanzaban á buena hora, *f*) Creo que sí, *g*) Llama á la *h*) Duraba buen rato, *i*) ¿Qué tiempo hace? *j*) ¿Qué hay de

11 Write the plural of *el caballo*, *el lunes*, *el pie*, *la rey*, *el gentilhombre*, *el rubí*, *la cruz*, *el agua*, *la verdad*

12 Mention *three* classes of nouns with which the article is omitted in Spanish but not in English.

13 Translate into Spanish: *a*) I am hungry, *b*) Pe is possible to see it, *c*) They are at school, *d*) Love witl heart, *e*) The day and night were fair, *f*) Here there is summer, *g*) I am right, *h*) My merit is greater than t Go away, *j*) Whom do you seek?

14 Write the cardinal and the ordinal numeral ac from one to 10 [Do not use figures].

15 Write from memory and translate at least 10 cor lines of any Spanish poem.

High School Department

167TH EXAMINATION

SPANISH—Second Year

Thursday, January 24, 1901—1.15 to 4.15 p. m., only

Answer questions 7 and 8 and eight of the others but **no more.** *If more than eight of the others are answered only the first eight answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–2 Translate into English:

LA FAMILIA DE ALVAREDA

¡Oh!—exclamó el marqués—¡qué dolor! ¡este magnífico naranjo se ha secado!!

—Sí, era más viejo que el mundo, señor—dijo la anciana—y estaba hecho á mucho mimo y mucho cuidado. Desde que la pobre Ana perdió á sus hijos, ni ella ni nadie se cuidaba de él, y se secó.

—¿Y este perro?—preguntó el marqués, viendo á un pobre perro viejo y ciego, retirado en un rincón.

—¡El pobre Melampo! Desde que faltó su amo se puso triste y cegó. Ana me recomendó antes de morir que lo cuidase: fué casi lo único que la pobre habló; pero no será menester, porque cuando salió el cadáver se puso á aullar, y desde entonces no ha querido comer.—

El marqués se acercó. El perro estaba muerto.

—*Fernán Caballero*

naranjo=orange-tree, *mimo*=affection, *rincón*=corner, *aullar* =howl

3–4 Translate into English:

EL SÍ DE LAS NIÑAS

D. Carlos—Para todo me da valor. . . . En fin, ya estoy aquí. ¿Usted me llama para que la defienda, la libre, la cumpla una obligación mil y mil veces prometida? Pues á eso mismo vengo yo. . . Si ustedes se van á Madrid mañana, yo voy también. Su madre de usted sabrá quien soy. . . Allí puedo contar con el favor de un anciano respetable y virtuoso, á quien más que tío debo llamar amigo y padre. No tiene otro deudo más inmediato ni más querido que yo; es hombre muy rico, y si los dones de la fortuna tuviesen para usted algún atractivo, esta circunstancia añadiría felicidades á nuestra unión.

—*Leandro F. de Moratín*

valor=courage, *deudo*=relative

5–6 Translate into English:

DOÑA PERFECTA

Querida tía—dijo el ingeniero con gravedad.—Ni yo he despreciado las creencias de nadie, ni yo tengo las ideas que

usted me atribuye. Quizás haya estado un poco irrespetuoso en la iglesia; soy algo distraído. Mi entendimiento y mi atención estaban fijos en la obra arquitectónica, y francamente no advertí . . . pero no era esto motivo para que el señor obispo intentase echarme á la calle, y usted me supusiera capaz de atribuir á un papelillo de la botica las funciones del alma. Puedo tolerar eso como broma, nada más que como broma.—

Pepe Rey sentía en su espíritu excitación tan viva, que á pesar de su mucha prudencia y mesura no pudo disimularla.

—*Pérez Galdós*

despreciar=disregard, *distraído*=absent-minded, *papelillo de la botica*=prescription, *broma*=joke

7 Translate into Spanish: *a*) I shall accuse nobody, *b*) When she awoke they wondered at her great beauty, *c*) The reading having been finished, he knew that his end was near, *d*) I have been thinking that perhaps I might meet the soldiers below, *e*) He put to flight three hundred of the enemy.

8 Conjugate *sentir* in the preterit (past definite or aorist) indicative active, *volver* in the present subjunctive active, *comer* in the imperfect indicative active, *entrever* in the present indicative active, *amar* in the future subjunctive active.

9 State *three* rules for the use of the subjunctive. Illustrate by original Spanish sentences.

10 Translate into English the following bill of exchange:

Manzanillo, Enero 17 de 1901

Valga por $482.

A sesenta días vista mandarán VV. pagar por esta tercera de cambio (no habiéndolo hecho por la primera ó segunda) á la orden de Ramón Navarro la suma de cuatrocientos ochenta y dos pesos, valor recibido en mercancias, que pasarán en cuenta á su afectísimo seguro servidor.

C. D. Martínez

Al Srs. Geo. Larkin & Co.,
Nueva York

11 Translate into Spanish: *a*) That was not to be thought of, *b*) He scarcely knew, *c*) Take a walk, *d*) Go slowly, *e*) Her dress becomes her, *f*) They arrived at night, *g*) Set the table, please, *h*) I am sorry, *i*) It is nothing, *j*) Happen what may.

12 Distinguish in use *a*) *pero* and *sino*, *b*) *ahí*, *allá* and *aquí*, *c*) *que*, *de* and *de lo que* with comparatives. Explain the difference between *casa* and *habitación*.

13 Mention *seven* adjectives that omit the final *o* before their nouns; *three* adjectives that omit the final syllable before their nouns.

14 Translate into English, giving the force of each suffix: *armada*, *hombrón*, *mocetón*, *bastonada*, *manecita*, *fusilazo*, *sencillez*, *hombrecillo*, *sopera*, *callejuela*.

15 Write from memory and translate at least 15 consecutive lines of any Spanish poem.

High School Department

169TH EXAMINATION

SPANISH—Second Year

Thursday, June 20, 1901—1.15 to 4.15 p. m., only

ınswer questions 7 and 8 and eight of the others but **no more.** *If re than eight of the others are answered only the first eight answers 'l be considered. Division of groups is not allowed. Each complete wer will receive 10 credits. Papers entitled to 75 or more credits 'l be accepted.*

-2 Translate into English:

EL CAPITÁN VENENO

Σstas amabilidades del Capitán Veneno y, sobre todo, el canto la jota aragonesa, eran privilegio exclusivo en favor de la dre; pues tan luego como Angustias se acercaba á la alcoba, ıban completamente; y el enfermo ponía cara de turco. érase que odiaba de muerte á la hermosa joven, tal vez por nismo que nunca lograba disputar con ella, ni verla incolada, ni que tomase por lo serio las atrocidades que él le ía, ni sacarla de aquella serenidad un poco burlona que el :ado calificaba de constante insulto.—*Alarcón*

ota=tune, *aragonés*=Aragonese, *de turco*=severe, *burlón*=:king, *cuitado*=wretched

-4 Translate into English:

JOSÉ

erca de la capilla de San Esteban había una casucha que itaba un labrador encargado por el gremio de mareantes, liante un cortísimo estipendio anual, de encender las horas que servían de señal en los días ó noches de peligro. e labrador, aunque se había embarcado pocas veces, conocía ıar como cualquier práctico. Después de observarla con atenı un buen rato y haber vacilado muchas veces, sacó de la 'alada de su choza una carga de retama seca y tojo, la colocó o más alto del monte y la dió fuego. Era el primer aviso ı los pescadores.—*Palacio Valdés*

sucha=hut, *gremio*=society, *hoguera*=beacon, *corralada*=osure, *choza*=hovel, *retama*=broom, *tojo*=furze

6 Translate into English:

GIL BLAS

egó al día siguiente á casa del padre de Florentina una :ie de aldeano, que traía una maleta: no me hallaba yo en

casa á la sazón, pero estaba en ella Morales.—Señor—dijo el hombre al buen viejo—soy criado del caballero de Calatrava que ha de ser vuestro yerno; quiero decir del señor Pedro de la Membrilla; acabamos ahora de llegar los dos, y él estará aquí dentro de un momento; yo me he adelantado para avisárselo á su merced.—Apenas acabó de decir esto, cuando llegó su amo, lo que sorprendió mucho al viejo, y turbó algo á Morales.

—*Le Sage* (*Padre Isla's translation*)

aldeano=countryman, *maleta*=valise, *yerno*=son-in-law

7 Translate into Spanish: *a*) Depart at three o'clock in the morning without waiting for me, *b*) I beg you to go while you yet have time, *c*) Go slowly but surely, *d*) I have never learned his name though I have seen him very often, *e*) I shall try to do it immediately.

8 Conjugate *discernir* in the preterit (past definite or aorist) indicative active, *morir* in the imperfect indicative, *coger* in the present indicative active, *estar* in the present indicative, *dar* in the future subjunctive active.

9 Write and translate a Spanish sentence illustrating the use of *each* of the following: *de golpe*, *por ventura*, *bien que*, *hasta que*, *antes de*.

10 Write in Spanish an interest bearing promissory note in proper business form.

11 Distinguish in meaning *a*) *conocer* and *saber*, *b*) *ser* and *estar*, *c*) *dejar* and *dejar de*, *d*) *campo*, *país*, *patria* and *tierra*.

12 Write the first person singular and plural of *a*) the present indicative active of *caber*, *b*) the present subjunctive active of *poner*, *c*) the preterit (past definite or aorist) indicative active of *pedir*, *d*) the future indicative active of *partir*, *e*) the future conditional of *venir*.

13 Write the feminine of *el toro*, *el rey*, *el león*, *el barón*, *el artista*, *el joven*, *el mozo*, *el gigante*, *el autor*, *el caballero*.

14 Mention *three* cases in which the direct object of a verb may be preceded by *á*. Illustrate by original Spanish sentences.

15 Write from memory and translate at least 15 consecutive lines of any Spanish poem.

High School Department

167TH EXAMINATION

SPANISH—Third Year

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

nswer question 7 and nine of the others but **no more.** *If more than of the others are answered only the first nine answers will be conred. Division of groups is not allowed. Each complete answer receive 10 credits. Papers entitled to 75 or more credits will be pted.*

-2 Translate into English:

DON QUIJOTE

:n esto descubrieron treinta ó cuarenta molinos de viento hay en aquel campo; y así como Don Quijote los vió, dijo ı escudero: la ventura va guiando nuestras cosas mejor de que acertáramos á desear; porque ves allí, amigo Sancho ıza, donde se descubren treinta ó poco más desaforados antes con quien pienso hacer batalla y quitarles á todos las ıs, con cuyos despojos comenzaremos á enriquecer; que esta ouena guerra, y es gran servicio de Dios quitar tan mala iente de sobre la faz de la tierra.—¿Qué gigantes?—dijo cho Panza.—Aquellos que allí ves—respondió su amo—os brazos largos, que los suelen tener algunos de casi dos ıas.—*Cervantes*

'saforado=huge, *simiente*=race

-4 Translate into English:

A LA MUERTE DE DON ANTONIO RIOS ROSAS

¡Cayó como la piedra en la laguna
ın rudo golpe en la insondable fosa!
a no levantará tormenta alguna
ı elocuencia, vibrando en la tribuna,
ımo el rayo terrible y luminosa.

¡Triste destino de la gloria humana
n costosa, tan mísera y tan vana!
ıyer grandeza, y entusiasmo, y ruido;
ıy tributo de lágrimas; mañana
ndo silencio, y soledad, y olvido!

En la infinita sed que nos aqueja,
ıé es nuestra vida? El sueño de un momento,
ıa que pasa, sombra que se aleja,
: tímida y muda que no deja
el rastro de sus alas en el viento.—*Núñez de Arce*

ındable=fathomless, *sed*=anxiety, *aquejar*=afflict, *rastro*
:e

5–6 Translate into English:

PARTIR A TIEMPO

Vizconde—¡Oh! lo sé! no se me ha olvidado todavía aquel lance que tuviste en una ocasión con un caballerete insolente que quiso burlarse de él, y que quedó suficientemente escarmentado. Pero cuando me recuerdo de su mujer, cuyo buen tono y distinguidos modales. . .

Carlos—¡Ah! eso es lo menos en ella; fuera imposible encontrar reunidos más virtud y más juicio. Casada por orden de sus padres, cuyo bienestar aseguraba este enlace, con un hombre cuyo género de vida y cuya educación no podían simpatizar nunca con ella, no desconoció los inconvenientes de su posición. Pero ha sabido triunfar de ella, y donde otra hubiera visto tan solo un deber, ella ha sabido encontrar la felicidad.

—*Larra*

lance=quarrel, *escarmentar*=reprimand

7 Translate into Spanish: By imitation of the French our dramatic poetry came to be classic; classic as was the French or as the Italian and Latin had been, but not as the Greek was or as it ought to have been if it had been a true classic.

8 Conjugate the simple tenses of the indicative and conditional of *ir*.

9 Explain the difference in the use of the four simple tenses of the subjunctive in subordinate clauses. Illustrate by original Spanish sentences.

10 Translate into English: *a*) Como dijo el otro, *b*) Voy á casa ahora, *c*) Hace mucho que estoy esperando, *d*) Yo salgo por ella, *e*) No sabe lo que se pesca, *f*) Se sirven un viejo carro, *g*) Siento no poder ir, *h*) Sigue la medicina, *i*) Echó á volar, *j*) ¿Vino bueno?

11 State the rules for the agreement of the gerund and of the past participle. Illustrate by original Spanish sentences.

12 Scan the first *two* lines of 3–4, marking the division of syllables. Mention the name of this verse. Define the following: *copla*, *asonancia*, *villancico*, *verso suelto*, *verso de pie quebrado*.

13 Translate into Spanish: *a*) He almost died, *b*) Nevertheless it is so, *c*) She took leave, *d*) They are good for nothing, *e*) Do not talk nonsense, *f*) At times he stopped, *g*) Henceforth it may be so, *h*) Set to work, *i*) After this manner, *j*) According to everybody.

14 Write in Spanish about 75 words on the life and works of *one* of the following: Cervantes, Lope de Vega, Espronceda.

15 Write from memory and translate at least 15 consecutive lines of any Spanish poem.

High School Department

169TH EXAMINATION

SPANISH—Third Year

Tuesday, June 18, 1901—1.15 to 4.15 p. m., only

Answer question 7 and nine of the others but **no more.** *If more than ne of the others are answered only the first nine answers will be con- lered. Division of groups is not allowed. Each complete answer 'll receive 10 credits. Papers entitled to 75 or more credits will be cepted.*

1–2 Translate into English:

DON QUIJOTE

Pero vosotros pagaréis la grande blasfemia que habéis dicho ntra tamaña beldad, como lo es la de mi señora.—Y en di- endo esto, arremetió con la lanza baja contra él que lo había cho, con tanta furia y enojo, que si la buena suerte no hiciera le en la mitad del camino tropezara y cayera Rocinante, lo isara mal el atrevido mercader. Cayó Rocinante, y fué ro- indo su amo una buena pieza por el campo, y queriéndose le- intar, jamás pudo: tal embarazo le causaban la lanza, adarga, puelas y celada con el peso de las antiguas armas. Y entre- nto que pugnaba por levantarse, y no podía, estaba diciendo: on huyáis, gente cobarde, gente cautiva; atended que no por ilpa mía, sino de mi caballo, estoy aquí tendido.—*Cervantes*

arremeter=attack, *adarga*=shield, *espuela*=spur, *celada*= elmet

3–4 Translate into English:

LA INDEPENDENCIA

Don Juan—Ya bastante disminuida por la activa persecución e las tropas realistas, muy superiores en número, fué, pocos as hace derrotada y dispersa en el ataque de Morón. El udillo Riego busca un refugio en Portugal con pocos de sus ás fieles oficiales. Yo soy uno de ellos, pero un balazo me ató el caballo ayer tarde; resentido todavía del que recibí en te muslo al principio de la campaña, no puedo ya caminar, y eré en manos de mis enemigos si V. no me da un asilo . . .

Don Agustín—(¡Friolera! Peor es esto que pedirme dinero.)

Don Juan—(¡Malo! Me va á negar la hospitalidad.)

caudillo=commander —*Herreros*

5–6 Translate into English:

GRANADA

¡Escrito estaba así! Dios en su mano
'iene los corazones de los reyes,
' sus profundos cálculos políticos
a voluntad de Dios acota siempre.

Esa nación, que poderosa nace
De las ruinas de aquella que perece,
Al mandato de Dios brota y se encumbra
Y en alas sólo de su aliento viene.
Los pueblos y las razas se renuevan,
Devorando el que nace al que fenece,
Como en la inundación bajo las aguas
Se renueva el país que se sumerge.—*Zorrilla*

acotar=bound, *encumbrarse*=flourish

7 Translate into Spanish: While in this prison Cervantes is said to have composed his immortal *Don Quixote;* thus this work, so clever and so humorous, was composed in a prison in which, according to our author, "Every inconvenience has its corner and every doleful sound its dwelling-place."

8 Conjugate *reir* in the imperfect and preterit (past definite or aorist) indicative, *traducir* in the present subjunctive active, *poner* in the future and perfect indicative active.

9 Discuss, with illustrations, the position of the attributive adjective. State, with illustrations, *three* cases in which the personal pronoun, used as object of the verb, follows the verb.

10 Translate into English: *a*) No dejaba piedra por mover, *b*) Clava la vista, *c*) El viento le llevó el sombrero, *d*) El sol nos da de espaldas, *e*) Me guardaré de decirles nada, *f*) Nada se me va en ello, *g*) Amanecimos en Habana, *h*) Esas figuras deben ser hombres, *i*) Este traje me queda muy bien, *j*) ¡Ojalá que él viva!

11 Mention, with meaning, a Spanish noun derived from *each* of the following: *mudar*, *amenazar*, *venir*, *rodear*, *nacer*, *nuevo*, *mucho*, *honrado*, *triste*, *amargo*.

12 Scan the last *three* lines of 5–6, marking division of syllables. Show by illustration the difference between *rima consonante* and *rima asonante*.

13 Translate into Spanish: *a*) I have not had it since yesterday, *b*) He had never been there, *c*) Bring only the large ones, *d*) She neither saw nor heard them, *e*) The region will support neither man nor beast.

14 Write in Spanish at least 75 words on the life and works of *one* of the following: Góngora, Alfonso *el sabio*, Zorrilla, Tirso de Molina.

15 Write from memory and translate at least 15 consecutive lines of any Spanish poem.

High School Department

167TH EXAMINATION

GREEK—First Year

'hursday, January 24, 1901—9.15 a. m. to 12.15 p. m., only

Answer question 15 and nine of the others but **no more.** *If more than* *ine of the others are answered only the first nine answers will be* *nsidered. Each complete answer will receive 10 credits. Papers enti-* *ed to 75 or more credits will be accepted.*

1 Define and illustrate *each* of the following: reduplication, roperispomenon, liquid verb, elision. Write with proper ccents ουτος φησιν.

2 Give the stem of *each* of the following words and show ow the nominative singular is derived from the stem: ῥήτωρ, ξ. Write correctly *each* of the following and give the rule or the euphonic change in each: λελεγται, συνβουλευω.

3 Write the genitive and dative, singular and plural, of πλίτης, κῆρυξ, στράτευμα, πόλις, ἀνήρ.

4 Decline τεῖχος, with the article, in the singular; πολλοὶ παῖδες n the plural; αὕτη ἡ κώμη in both singular and plural.

5 Decline the present active participle of φιλῶ (φιλέω) in ingular and plural, all genders, giving contracted forms only.

6 Compare σοφός, μέλας, μικρός, κακός. Give the rules for the ormation of an adverb from the comparative and from the uperlative of κακός. Illustrate in each case.

7 Conjugate τίθημι in the imperfect indicative middle; ἔχω the present subjunctive active. Give all the active participles of λείπω.

8 Write the principal parts of πράττω, βαίνω, ἔχω, φέρω, βουλεύω.

9 Translate into Greek: *a*) He had the same army but other nerals, *b*) This man will bring five talents, *c*) If we march o the city the barbarians will flee, *d*) He sent all the soldiers that no one was left.

10 Translate into English:

Καὶ ταύτῃ μὲν τῇ ἡμέρᾳ ἀπῆλθον οἱ βάρβαροι· τὴν δ' ἐπιοῦσαν ἡμέραν ναν οἱ Ἕλληνες καὶ ἐπεσιτίσαντο· ἦν γὰρ πολὺς σῖτος ἐν ταῖς κώμαις. δὲ ὑστεραίᾳ ἐπορεύοντο διὰ τοῦ πεδίου, καὶ Τισσαφέρνης εἵπετο.

πισιτίζομαι = procure supplies, ἕπομαι = follow

1 Give the syntax of ἡμέρᾳ, ἡμέραν. State where each of the owing forms is found: ἀπῆλθον, ἔμειναν, ἐπορεύοντο.

12 Translate into English:

a Λαμβάνουσιν αὐτὸν καὶ γυναῖκας καὶ παῖδας καὶ τοὺς ἵππους καὶ τὰ ἄλλα.

b Ὁ στρατηγὸς λαβὼν τὸ στράτευμα ἐπολέμει πρὸς Τισσαφέρνη

c Εἰ λίποιμι τὰ χρήματα ἐν τῇ πόλει, εὕροιεν ἂν οἱ βάρβαροι.

13 Give the verb stem (theme) of each of *two* of the fo ing verbs and show how the present stem and the future are formed from the verb stem: *στέλλω, τίθημι, τρέπω,* *γιγνώσκω.*

14 Write Greek sentences illustrating *three* of the follo cause, exhortation, accusative of extent of space, pred genitive, infinitive used as subject.

15 Translate into Greek: *a*) He said that the Greeks come, *b*) The king persuaded him to follow, *c*) While was collecting his army Xenophon arrived, *d*) I have co order that I may see your brother.

University of the State of New York

High School Department

169TH EXAMINATION

GREEK—First Year

Thursday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

Answer question 15 and nine of the others but **no more.** *If more than nine of the others are answered only the first nine answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Classify the mutes. Define and illustrate improper diphthong, enclitic.

2 Accent the following words, giving the rule for the accent of each: ἀνθρωπου, χωρας, στρατιωται. Write the contracted form and give the rule for the contraction of *each* of the following: ἐτίμαε, ἀπὸ ὤν.

3 Decline in singular and plural βασιλεύς, γέφυρα, νύξ, στρατηγός, πατήρ.

4 Decline πολὺ στράτευμα in the singular; καλαὶ κῶμαι in the plural; ὁ αὐτὸς ἀνήρ in both singular and plural.

5 Compare πολύς, ἀγαθός, ταχύς, χαρίεις. Form *two* different adverbs from μέγας and give the rule for the formation of each.

6 Write all the active infinitives and participles of λύω, giving the name of each.

7 Conjugate δίδωμι in the imperfect indicative active; λαμβάνω in the second aorist subjunctive active; γίγνομαι in the second perfect indicative.

8 Write the principal parts of ἵστημι, ἄγω, ἔρχομαι, πάσχω, ἁλίσκομαι.

9 Translate into Greek: *a*) Urge the soldiers to go forward, *b*) Let us remain in the village four days, *c*) If we had crossed the river, we should have found the barbarians.

10 Translate into English:

Ταῦτα ἔδοξε· καὶ ὤμοσαν καὶ δεξιὰς ἔδοσαν τοῖς τῶν Ἑλλήνων στρατηγοῖς, καὶ ἔλαβον παρὰ τῶν Ἑλλήνων. Μετὰ δὲ ταῦτα Τισσαφέρνης εἶπε· Νῦν μὲν δὴ ἄπειμι ὡς βασιλέα.

ὄμνυμι=take an oath

11 Give the syntax of Ἑλλήνων, στρατηγοῖς. State where each of the following forms is found: ἔδοξε, ἔδοσαν, εἶπε.

12 Translate into English:

a Ὁ βάρβαρος ἔδωκε Κύρῳ πολλὰ χρηματα εἰς τὴν στρατιάν.

b Οἱ ἄγγελοι αἰτοῦσι Κῦρον πλοῖα.

c Ἐὰν ἐπιθώμεθα τοῖς πολεμίοις, νικήσομεν.

d Νομίζω ὑμᾶς ἐμοὶ εἶναι καὶ πατρίδα καὶ φίλους καὶ συμμάχους.

13 Give the verb stem (theme) of each of *three* of the following verbs and show how the aorist stem is formed from the verb stem: πέμπω, ποιέω, στέλλω, τίθημι, φαίνω.

14 Write Greek sentences illustrating *three* of the following: genitive of time, partitive genitive, purpose, present particular condition, temporal clause.

15 Translate into Greek:

a If we should remain in the plain, the enemy would flee.

b The generals said that they would come with the cavalry and take the city.

c May the army march rapidly to the sea.

d Are we all friends of Cyrus?

High School Department

167TH EXAMINATION

XENOPHON'S ANABASIS

esday, January 22, 1901 — 1.15 to 4.15 p. m., only

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r the first six questions and four of the others but **no more.** *If* *ı four of the others are answered only the first four answers* *nsidered. Each complete answer will receive 10 credits. Papers* *0 75 or more credits will be accepted.*

ranslate into English:

CLEARCHUS ADDRESSES HIS SOLDIERS

ιδὴ δὲ Κῦρος ἐκάλει, λαβὼν ὑμᾶς ἐπορευόμην, ἵνα, εἴ τι δέοιτο, κήην αὐτὸν ἀνθ' ὧν εὖ ἔπαθον ὑπ' ἐκείνου. Ἐπεὶ δὲ ὑμεῖς οὐ βούλεσθε ρεύεσθαι, ἀνάγκη δή μοι ἢ ὑμᾶς προδόντα τῇ Κύρου φιλίᾳ χρῆσθαι ς ἐκεῖνον ψευσάμενον μεθ' ὑμῶν εἶναι. Εἰ μὲν δὴ δίκαια ποιήσω οὐκ αἱρήσομαι δ' οὖν ὑμᾶς, καὶ σὺν ὑμῖν ὅ τι ἂν δέῃ πείσομαι. Καὶ ε ἐρεῖ οὐδεὶς ὡς ἐγώ, Ἕλληνας ἀγαγὼν εἰς τοὺς βαρβάρους, προδοὺς Ελληνας τὴν τῶν βαρβάρων φιλίαν εἱλόμην. — 1, 3

REPLY OF TISSAPHERNES

δ' ἐν πᾶσι τούτοις ἡττῴμεθα, ἀλλὰ τό γέ τοι πῦρ κρεῖττον τοῦ ῦ ἐστιν· ὃν ἡμεῖς δυναίμεθ' ἂν κατακαύσαντες λιμὸν ὑμῖν ἀντιτάξαι, ᾧ οὐδ' εἰ πάνυ ἀγαθοὶ εἴητε μάχεσθαι ἂν δύναισθε. Πῶς ἂν οὖν ἔχοντες τους πόρους πρὸς τὸ ὑμῖν πολεμεῖν, καὶ τούτων μηδένα ἡμῖν ἐπικίν- ἔπειτα ἐκ τούτων πάντων τοῦτον ἂν τὸν τρόπον ἐξελοίμεθα ὃς μόνος ρὸς θεῶν ἀσεβής, μόνος δὲ πρὸς ἀνθρώπων αἰσχρός; — 2, 5

XENOPHON ENCOURAGES THE CAPTAINS

εὶ μέντοι ἐκεῖνοι ἔλυσαν τὰς σπονδάς, λελύσθαι μοι δοκεῖ καὶ ἡ ν ὕβρις καὶ ἡ ἡμετέρα ὑποψία. Ἐν μέσῳ γὰρ ἤδη κεῖται ταῦτα τὰ , ἆθλα, ὁπότεροι ἂν ἡμῶν ἄνδρες ἀμείνονες ὦσιν· ἀγωνοθέται δ' οἱ ἰσιν, οἳ σὺν ἡμῖν, ὡς τὸ εἰκός, ἔσονται. Οὗτοι μὲν γὰρ αὐτοὺς κήκασιν· ἡμεῖς δέ, πολλὰ ὁρῶντες ἀγαθά, στεῤῥῶς αὐτῶν ἀπειχόμεθα ὺς τῶν θεῶν ὅρκους· ὥστε ἐξεῖναί μοι δοκεῖ ἰέναι ἐπὶ τὸν ἀγῶνα σὺν φρονήματι μείζονι ἢ τούτοις. — 3, 1

nslate into Greek:

must either betray you or be false to Cyrus, and I do not know which I shall choose.

et us refrain from war till the treaties are broken.

earchus said that he would go with his soldiers since they did not wish to go with him.

7 Give the reason for the case of μοι (*a*, 3), φιλίᾳ (*a*, 3), καρποῦ (*b*, 2), ὑμῖν (*b*, 4), τούτων (*b*, 4), αὐτῶν (*c*, 5); for the mode of ὠφελοίην (*a*, 2), δέῃ (*a*, 5), ἐξελοίμεθα (*b*, 5), ὦσιν (*c*, 3).

8 Give the syntax of προδόντα (*a*, 3), ἀντιτάξαι (*b*, 2), πολεμεῖν (*b*, 4), ἰέναι (*c*, 6). Classify the following participles: λαβὼν (*a*, 1), ἀγαγὼν (*a*, 6), ἔχοντες (*b*, 3). Decline τοσούτους (*b*, 4) in the singular in all genders.

9 From what verb is each of the following and where is the form found: ἔπαθον (*a*, 2), εἱλόμην (*a*, 7), ἡττῴμεθα (*b*, 1), λελύσθαι (*c*, 1), ἐπιωρκήκασιν (*c*, 5)?

10 Conjugate οἶδα (*a*, 5), κεῖται (*c*, 2) in the voice, mode and tense here found. Write the first form of each mode including participle of αἱρήσομαι (*a*, 5) in the voice and tense here found. Compare αἰσχρός (*b*, 6), μείζονι (*c*, 7).

11 Write the principal parts of ἐκάλει (*a*, 1), ψευσάμενον (*a*, 4), κατακαύσαντες (*b*, 2), ἀντιτάξαι (*b*, 2), ἀπειχόμεθα (*c*, 5).

12 Explain the force of δή (*a*, 3), οὖν (*a*, 5), γὰρ (*c*, 2). Distinguish in meaning between πρός with the genitive and πρός with the accusative, illustrating from the above passages.

13 Explain the force of the voice of αἱρήσομαι (*a*, 5); the force of the tense of ἀπειχόμεθα (*c*, 5). Account for the use of ἂν (*b*, 5); the accent of ἐξεῖναί (*c*, 6). Distinguish in use between ὥστε with the indicative and ὥστε with the infinitive.

14 Give the composition of each of the following words and the meaning of each part: συμπορεύεσθαι (*a*, 3), οὐδεὶς (*a*, 6), ἀντιτάξαι (*b*, 2). Select from questions 1–5 *four* Greek words and from *each* of these give a derivative Greek word.

15 Translate into English [This must be taken by those who desire credit for the fourth book]:

THE GREEKS CELEBRATE GAMES

Ἠγωνίζοντο δὲ παῖδες μὲν στάδιον τῶν αἰχμαλώτων οἱ πλεῖστοι, δόλιχον δὲ Κρῆτες πλείους ἢ ἑξήκοντα ἔθεον· πάλην δὲ καὶ πυγμὴν καὶ παγκράτιον ἕτεροι· καὶ καλὴ θέα ἐγένετο· πολλοὶ γὰρ κατέβησαν, καί, ἅτε θεωμένων τῶν ἑταίρων, πολλὴ φιλονεικία ἐγίγνετο. Ἔθεον δὲ καὶ ἵπποι· καὶ ἔδει αὐτοὺς κατὰ τοῦ πρανοῦς ἐλάσαντας ἐν τῇ θαλάττῃ ἀναστρέψαντας πάλιν ἄνω πρὸς τὸν βωμὸν ἄγειν. Καὶ κάτω μὲν οἱ πολλοὶ ἐκυλινδοῦντο· ἄνω δὲ πρὸς τὸ ἰσχυρῶς ὄρθιον μόλις βάδην ἐπορεύοντο οἱ ἵπποι.—4, 8

High School Department

168TH EXAMINATION

XENOPHON'S ANABASIS

Thursday, March 28, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CYRUS PACIFIES THE SOLDIERS

Ταῦτα οἱ στρατηγοὶ Κύρῳ ἀπήγγελλον· ὁ δ' ὑπέσχετο ἀνδρὶ ἑκάστῳ δώσειν πέντε ἀργυρίου μνᾶς, ἐπὰν εἰς Βαβυλῶνα ἥκωσι, καὶ τὸν μισθὸν ἐντελῆ μέχρις ἂν καταστήσῃ τοὺς Ἕλληνας εἰς Ἰωνίαν πάλιν. Τὸ μὲν δὴ πολὺ τοῦ Ἑλληνικοῦ οὕτως ἐπείσθη. Μένων δέ, πρὶν δῆλον εἶναι τί ποιήσουσιν οἱ ἄλλοι στρατιῶται, πότερον ἕψονται Κύρῳ ἢ οὔ, συνέλεξε τὸ αὑτοῦ στράτευμα χωρὶς τῶν ἄλλων, καὶ ἔλεξε τάδε.—1, 4

b THE GREEKS WILL ABIDE BY THEIR OATHS

Πρῶτον μὲν γὰρ καὶ μέγιστον οἱ θεῶν ἡμᾶς ὅρκοι κωλύουσι μὴ πολεμίους εἶναι ἀλλήλοις· ὅστις δὲ τούτων σύνοιδεν αὑτῷ παρημεληκώς, τοῦτον ἐγὼ οὔποτ' ἂν εὐδαιμονίσαιμι. Τὸν γὰρ θεῶν πόλεμον οὐκ οἶδα οὔτ' ἀπὸ ποίου ἂν τάχους οὔτε ὅποι ἄν τις φεύγων ἀποφύγοι, οὔτ' εἰς ποῖον ἂν σκότος ἀποδραίη, οὔθ' ὅπως ἂν εἰς ἐχυρὸν χωρίον ἀποσταίη. Πάντῃ γὰρ πάντα τοῖς θεοῖς ὕποχα, καὶ πανταχῇ πάντων ἴσον οἱ θεοὶ κρατοῦσι.—2, 5

c THE GREEKS ARE ATTACKED

Οἱ δὲ ὀπισθοφύλακες τῶν Ἑλλήνων ἔπασχον μὲν κακῶς, ἀντεποίουν δ' οὐδέν· οἵ τε γὰρ Κρῆτες βραχύτερα τῶν Περσῶν ἐτόξευον, καὶ ἅμα ψιλοὶ ὄντες εἴσω τῶν ὅπλων κατεκέκλειντο· οἵ τε ἀκοντισταὶ βραχύτερα ἠκόντιζον ἢ ὡς ἐξικνεῖσθαι τῶν σφενδονητῶν. Ἐκ τούτου Ξενοφῶντι ἐδόκει διωκτέον εἶναι· καὶ ἐδίωκον τῶν τε ὁπλιτῶν καὶ τῶν πελταστῶν οἳ ἔτυχον σὺν αὐτῷ ὀπισθοφυλακοῦντες· διώκοντες δὲ οὐδένα κατελάμβανον τῶν πολεμίων.

—3, 3

6 Translate into Greek:

a Let us persuade the soldiers to follow Cyrus before he promises to give them more pay.

b If we knew what the barbarians were doing we should announce it to the generals.

c The enemy must be pursued and overtaken.

7 Give the reason for the case of ἀργυρίου (*a*, 2), Κύρῳ (*a*, 5), ἀλλήλοις (*b*, 2), θεῶν (*b*, 3), Περσῶν (*c*, 2), σφενδονητῶν (*c*, 4), πολεμίων (*c*, 6); for the mode of ἥκωσι (*a*, 2), εὐδαιμονίσαιμι (*b*, 3), ἀποφύγοι (*b*, 4).

8 Give the syntax of δώσειν (*a*, 2), εἶναι (*a*, 4), εἶναι (*b*, 2), παρημεληκώς (*b*, 2), ἐξικνεῖσθαι (*c*, 4), εἶναι (*c*, 5). Classify the following participles: φεύγων (*b*, 4), ὄντες (*c*, 3), διώκοντες (*c*, 6). Compare μέγιστον (*b*, 1).

9 From what verb is each of the following and where is the form found: ὑπέσχετο (*a*, 1), καταστήσῃ (*a*, 3), ἀποδραίη (*b*, 5), ἀντεποίουν (*c*, 1), κατεκέκλειντο (*c*, 3)?

10 Conjugate ἀποσταίη (*b*, 5), ἔτυχον (*c*, 5) in the voice, mode and tense here found. Write all the active infinitives and participles of ἀπήγγελλον (*a*, 1).

11 Write the principal parts of ἐπείσθη (*a*, 4), ἔπασχον (*c*, 1), ἐδίωκον (*c*, 5). Decline in singular and plural ἀνδρὶ (*a*, 1), ὅστις (*b*, 2) in the masculine.

12 Explain the force of δὴ (*a*, 3), γὰρ (*b*, 5), δὲ (*c*, 6). What other forms of the infinitive could be used in the clause ὁ δ' ὑπέσχετο . . . δώσειν (*a*, 1–2)? Mention *two* other Greek verbs that require the same construction as ὑπέσχετο.

13 Give the correlative of μὲν (*a*, 3); the uncontracted form of αὐτοῦ (*a*, 6); the force of the position of τοῦτον ἐγὼ (*b*, 2); the force of the tense of ἐτόξευον (*c*, 2). Distinguish in meaning ἀποφύγοι (*b*, 4) and ἀποδραίη (*b*, 5).

14 Give the composition of each of the following words and the meaning of each part: ἐντελῆ (*a*, 3), σύνοιδεν (*b*, 2), ὀπισθοφύλακες (*c*, 1). Mention *two* Greeks words containing the same stem as στρατηγοὶ (*a*, 1); *two* Greek words containing the same stem as πολεμίους (*b*, 1).

15 Translate into English [This must be taken by those who desire credit for the fourth book]:

XENOPHON PLANS AN ATTACK

Καὶ εἴς τε τὸ διαλεῖπον οὐ ῥᾴδιον ἔσται τοῖς πολεμίοις εἰσελθεῖν ἔνθεν καὶ ἔνθεν λόχων ὄντων, διακόψαι τε οὐ ῥᾴδιον ἔσται λόχον ὄρθιον προσιόντα. Ἐάν τέ τις πιέζηται τῶν λόχων, ὁ πλησίον βοηθήσει· ἤν τε εἴς πῃ δυνηθῇ τῶν λόχων ἐπὶ τὸ ἄκρον ἀναβῆναι, οὐδεὶς μηκέτι μείνῃ τῶν πολεμίων. Ταῦτα ἔδοξε, καὶ ἐποίουν ὀρθίους τοὺς λόχους. Ξενοφῶν δὲ ἀπιὼν ἐπὶ τὸ εὐώνυμον ἀπὸ τοῦ δεξιοῦ ἔλεγε τοῖς στρατιώταις· Ἄνδρες, οὗτοί εἰσιν, οὓς ὁρᾶτε, μόνοι ἔτι ἡμῖν ἐμποδὼν τὸ μὴ ἤδη εἶναι ἔνθα πάλαι ἐσπεύδομεν.—4, 8

High School Department

169TH EXAMINATION

XENOPHON'S ANABASIS

Tuesday, June 18, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CYRUS MUSTERS THE TROOPS

Ἐπεὶ δ' ἐδόκει αὐτῷ ἤδη πορεύεσθαι ἄνω, τὴν μὲν πρόφασιν ἐποιεῖτο ὡς Πεισίδας βουλόμενος ἐκβαλεῖν παντάπασιν ἐκ τῆς χώρας· καὶ ἀθροίζει ὡς ἐπὶ τούτους τό τε βαρβαρικὸν καὶ τὸ Ἑλληνικὸν ἐνταῦθα στράτευμα· καὶ παραγγέλλει τῷ τε Κλεάρχῳ λαβόντι ἥκειν ὅσον ἦν αὐτῷ στράτευμα· καὶ τῷ Ἀριστίππῳ συναλλαγέντι πρὸς τοὺς οἴκοι ἀποπέμψαι πρὸς ἑαυτὸν ὃ εἶχε στράτευμα· καὶ Ξενίᾳ τῷ Ἀρκάδι, ὃς αὐτῷ προεστήκει τοῦ ἐν ταῖς πόλεσι ξενικοῦ, ἥκειν παραγγέλλει λαβόντα τοὺς ἄνδρας, πλὴν ὁπόσοι ἱκανοὶ ἦσαν τὰς ἀκροπόλεις φυλάττειν.— 1, 2

b TISSAPHERNES EXPRESSES FRIENDSHIP FOR THE GREEKS

Ἐγώ, ὦ ἄνδρες Ἕλληνες, γείτων οἰκῶ τῇ Ἑλλάδι· καὶ ἐπεὶ ὑμᾶς εἶδον εἰς πολλὰ κακὰ κἀμήχανα ἐμπεπτωκότας, εὕρημα ἐποιησάμην εἴ πως δυναίμην παρὰ βασιλέως αἰτήσασθαι δοῦναί μοι ἀποσῶσαι ὑμᾶς εἰς τὴν Ἑλλάδα. Οἶμαι γὰρ ἂν οὐκ ἀχαρίστως μοι ἕξειν οὔτε πρὸς ὑμῶν οὔτε πρὸς τῆς Ἑλλάδος ἁπάσης. Ταῦτα δὲ γνοὺς ᾐτούμην βασιλέα, λέγων αὐτῷ ὅτι δικαίως ἄν μοι χαρίζοιτο, ὅτι αὐτῷ Κῦρόν τε ἐπιστρατεύοντα πρῶτος ἤγγειλα.— 2, 3

c THE BARBARIANS ENCAMP FOR THE NIGHT

Ἡνίκα δ' ἦν ἤδη δείλη, ὥρα ἦν ἀπιέναι τοῖς πολεμίοις· οὔ ποτε γὰρ μεῖον ἀπεστρατοπεδεύοντο οἱ βάρβαροι τοῦ Ἑλληνικοῦ ἑξήκοντα σταδίων, φοβούμενοι μὴ τῆς νυκτὸς οἱ Ἕλληνες ἐπιθῶνται αὐτοῖς. Πονηρὸν γὰρ νυκτός ἐστι στράτευμα Περσικόν. Οἵ τε γὰρ ἵπποι αὐτοῖς δέδενται, καὶ ὡς ἐπὶ τὸ πολὺ πεποδισμένοι εἰσί, τοῦ μὴ φεύγειν ἕνεκα εἰ λυθείησαν.— 3, 4

6 Translate into Greek:

a The Greeks were afraid that the enemy would flee during the night.

b Let us assemble an army and attack the barbarians before they can ask the king for cavalry.

c The Greeks would be grateful to Tissaphernes if he should save them from the Persian army.

7 Give the reason for the case of *αὐτῷ* (*a*, 1), *ξενικοῦ* (*a*, 7), *Ἑλλάδι* (*b*, 1), *σταδίων* (*c*, 2), *αὐτοῖς* (*c*, 3), *νυκτός* (*c*, 4); for the mode of *δυναίμην* (*b*, 3), *χαρίζοιτο* (*b*, 6), *ἐπιθῶνται* (*c*, 3), *λυθείησαν* (*c*, 5).

8 Give the syntax of *πορεύεσθαι* (*a*, 1), *ἀποπέμψαι* (*a*, 5), *ἐμπεπτωκότας* (*b*, 2), *ἔξειν* (*b*, 4), *ἀπιέναι* (*c*, 1), *φεύγειν* (*c*, 5). Classify the following participles: *βουλόμενος* (*a*, 2), *λαβόντα* (*a*, 7), *φοβούμενοι* (*c*, 3). Compare *δικαίως* (*b*, 6).

9 From what verb is each of the following and where is the form found: *συναλλαγέντι* (*a*, 5), *ἐμπεπτωκότας* (*b*, 2), *ἡτούμην* (*b*, 5), *δέδενται* (*c*, 4), *πεποδισμένοι εἰσί* (*c*, 5)?

10 Conjugate *εἶχε* (*a*, 6), *ἐπιθῶνται* (*c*, 3) in the voice, mode and tense here found. Write the first form of each mode including participle of *ἤγγειλα* (*b*, 7) in the voice and tense here found. Compare *μεῖον* (*c*, 2).

11 Write the principal parts of *ἐκβαλεῖν* (*a*, 2), *φυλάττειν* (*a*, 8), *δοῦναί* (*b*, 3), *φεύγειν* (*c*, 5), *λυθείησαν* (*c*, 5).

12 Explain the force of *ἤδη* (*a*, 1), *δὲ* (*b*, 5), *γὰρ* (*c*, 4). Give the force of the tense of *ἐποιεῖτο* (*a*, 1); the force of the voice of *ἡτούμην* (*b*, 5).

13 State the real object of Cyrus and write in Greek a *δέ* clause, in contrast with the *μέν* clause in (*a*, 1), expressing this object. Explain the contraction in *κἀμήχανα* (*b*, 2); the accent of *νυκτός* (*c*, 4); the use of *μὴ* (*c*, 5).

14 Give the composition or derivation of each of the following words: *πρόφασιν* (*a*, 1), *ἀκροπόλεις* (*a*, 8), *εὕρημα* (*b*, 2), *πονηρὸν* (*c*, 3). Show how the meaning of *συναλλαγέντι* (*a*, 5) is derived. Mention the Greek word or words from which each of the following is derived: geography, angel, strategy, cycle.

15 Translate into English [This must be taken by those who desire credit for the fourth book]:

CHIRISOPHUS TAKES COMMAND AT THE FORD

Πορευομένων δ' αὐτῶν ἀντιπαρῄεσαν αἱ τάξεις τῶν ἱππέων. Ἐπειδὴ δὲ ἦσαν κατὰ τὴν διάβασιν καὶ τὰς ὄχθας τοῦ ποταμοῦ, ἔθεντο τὰ ὅπλα, καὶ αὐτὸς πρῶτος Χειρίσοφος στεφανωσάμενος καὶ ἀποδὺς ἐλάμβανε τὰ ὅπλα, καὶ τοῖς ἄλλοις πᾶσι παρήγγελλε· καὶ τοὺς λοχαγοὺς ἐκέλευεν ἄγειν τοὺς λόχους ὀρθίους, τοὺς μὲν ἐν ἀριστερᾷ, τοὺς δ' ἐν δεξιᾷ ἑαυτοῦ. Καὶ οἱ μὲν μάντεις ἐσφαγιάζοντο εἰς τὸν ποταμόν· οἱ δὲ πολέμιοι ἐτόξευόν τε καὶ ἐσφενδόνων· ἀλλ' οὔπω ἐξικνοῦντο. Ἐπεὶ δὲ καλὰ ἦν τὰ σφάγια, ἐπαιάνιζον πάντες οἱ στρατιῶται καὶ ἀνηλάλαζον.—4, 3

University of the State of New York

High School Department

167TH EXAMINATION

HOMER'S ILIAD

Thursday, January 24, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a AGAMEMNON ADDRESSES ACHILLES

“μὴ δ' οὕτως, ἀγαθός περ ἐών, θεοείκελ' Ἀχιλλεῦ,
κλέπτε νόῳ, ἐπεὶ οὐ παρελεύσεαι οὐδέ με πείσεις.
ἦ ἐθέλεις, ὄφρ' αὐτὸς ἔχῃς γέρας, αὐτὰρ ἔμ' αὔτως
ἧσθαι δευόμενον, κέλεαι δέ με τήνδ' ἀποδοῦναι;
ἀλλ' εἰ μὲν δώσουσι γέρας μεγάθυμοι Ἀχαιοί,
ἄρσαντες κατὰ θυμόν, ὅπως ἀντάξιον ἔσται·
εἰ δέ κε μὴ δώωσιν, ἐγὼ δέ κεν αὐτὸς ἕλωμαι
ἢ τεὸν ἢ Αἴαντος ἰὼν γέρας, ἢ Ὀδυσῆος
ἄξω ἑλών· ὁ δέ κεν κεχολώσεται ὅν κεν ἵκωμαι.”—1, 131–139

b ZEUS SENDS A DREAM TO AGAMEMNON

“βάσκ' ἴθι, οὖλε ὄνειρε, θοὰς ἐπὶ νῆας Ἀχαιῶν·
ἐλθὼν ἐς κλισίην Ἀγαμέμνονος Ἀτρεΐδαο
πάντα μάλ' ἀτρεκέως ἀγορευέμεν ὡς ἐπιτέλλω.
θωρῆξαί ἑ κέλευε καρηκομόωντας Ἀχαιοὺς
πανσυδίῃ· νῦν γάρ κεν ἕλοι πόλιν εὐρυάγυιαν
Τρώων· οὐ γὰρ ἔτ' ἀμφὶς Ὀλύμπια δώματ' ἔχοντες
ἀθάνατοι φράζονται· ἐπέγναμψεν γὰρ ἅπαντας
Ἥρη λισσομένη, Τρώεσσι δὲ κήδε' ἐφῆπται.”— 2, 8–15

c ODYSSEUS AS AN ORATOR

“ἀλλ' ὅτε δὴ πολύμητις ἀναΐξειεν Ὀδυσσεύς,
στάσκεν, ὑπαὶ δὲ ἴδεσκε κατὰ χθονὸς ὄμματα πήξας,
σκῆπτρον δ' οὔτ' ὀπίσω οὔτε προπρηνὲς ἐνώμα,
ἀλλ' ἀστεμφὲς ἔχεσκεν, ἀΐδρεϊ φωτὶ ἐοικώς·
φαίης κε ζάκοτόν τέ τιν' ἔμμεναι ἄφρονά τ' αὔτως.
ἀλλ' ὅτε δὴ ὄπα τε μεγάλην ἐκ στήθεος εἵη
καὶ ἔπεα νιφάδεσσιν ἐοικότα χειμερίῃσιν,
οὐκ ἂν ἔπειτ' Ὀδυσῆΐ γ' ἐρίσσειε βροτὸς ἄλλος.”— 3, 216–223

6 Translate into Greek [Do not use rare or poetic constructions]:

a Agamemnon said "We must take the city both by land and by sea or we shall be unable to return home."

b He advised me not to remain, but I said that I could not leave the ship while the armies were fighting.

7 Give the Attic prose form for ἰών (*a*, 1), παρελεύσεαι (*a*, 2), δώωσιν (*a*, 7), 'Οδυσῆος (*a*, 8), 'Ατρεΐδαο (*b*, 2), ἀγορευέμεν (*b*, 3), κε (*b*, 5), ἔμμεναι (*c*, 5), νιφάδεσσιν (*c*, 7), χειμερίῃσιν (*c*, 7).

8 Give an account of the circumstances resulting from the dream in (*b*). State by whom and under what circumstances (*c*) was uttered.

9 Give the reason for the case of νόῳ (*a*, 2), ὅν (*a*, 9), Τρώεσσι (*b*, 8), φωτὶ (*c*, 4), 'Οδυσῆί (*c*, 8); for the mode of ἔχῃς (*a*, 3), δώωσιν (*a*, 7), ἵκωμαι (*a*, 9), ἕλοι (*b*, 5), ἐρίσσειε (*c*, 8).

10 Classify the following participles: ἰών (*a*, 1), ἄρσαντες (*a*, 6), ἔχοντες (*b*, 6), λισσομένη (*b*, 8). Explain the construction of ἀποδοῦναι (*a*, 4), ἔμμεναι (*c*, 5). Conjugate ἴθι (*b*, 1) in the voice, mode and tense here found. Compare ἀγαθός (*a*, 1).

11 From what verb is each of the following and where is the form found: ἧσθαι (*a*, 4), κεχολώσεται (*a*, 9), ἐφῆπται (*b*, 8), ἐνώμα (*c*, 3), εἴη (*c*, 6)?

12 Write the principal parts of πείσεις (*a*, 2), ἕλοι (*b*, 5), πήξας (*c*, 2). Explain the force of ἀπό in ἀποδοῦναι (*a*, 4); the formation of ἴδεσκε (*c*, 2).

13 Explain the force of περ (*a*, 1), γὰρ (*b*, 7), δὴ (*c*, 1). Account for the accent of θωρῆξαί (*b*, 4); for the position of the breathing of αἴδρεϊ (*c*, 4).

14 Give the composition of each of the following words and the meaning of each part: θεοείκελ' (*a*, 1), ἀντάξιον (*a*, 6), ἐπέγραψεν (*b*, 7). Explain the derivation of 'Ατρεΐδαο (*b*, 2).

15 Write the last *three* lines of (*a*), marking quantity of syllables, division into feet and principal cesuras. Define and illustrate alliteration, hiatus.

High School Department

169TH EXAMINATION

HOMER'S ILIAD

Thursday, June 20, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a ACHILLES IN ANGER ADDRESSES AGAMEMNON

“ἦ ποτ’ Ἀχιλλῆος ποθὴ ἵξεται υἷας Ἀχαιῶν
σύμπαντας· τότε δ’ οὔ τι δυνήσεαι ἀχνύμενός περ
χραισμεῖν, εὖτ’ ἂν πολλοὶ ὑφ’ Ἕκτορος ἀνδροφόνοιο
θνήσκοντες πίπτωσι· σὺ δ’ ἔνδοθι θυμὸν ἀμύξεις
χωόμενος, ὅ τ’ ἄριστον Ἀχαιῶν οὐδὲν ἔτισας.”
ὣς φάτο Πηλεΐδης, ποτὶ δὲ σκῆπτρον βάλε γαίῃ
χρυσείοις ἥλοισι πεπαρμένον, ἕζετο δ’ αὐτός·
Ἀτρεΐδης δ’ ἑτέρωθεν ἐμήνιε.—1, 240–247

b ADVICE TO AGAMEMNON

“οὔ τοι ἀπόβλητον ἔπος ἔσσεται, ὅ ττί κεν εἴπω.
κρῖν’ ἄνδρας κατὰ φῦλα, κατὰ φρήτρας, Ἀγάμεμνον,
ὡς φρήτρη φρήτρηφιν ἀρήγῃ, φῦλα δὲ φύλοις.
εἰ δέ κεν ὣς ἔρξῃς καί τοι πείθωνται Ἀχαιοί,
γνώσῃ ἔπειθ’ ὅς θ’ ἡγεμόνων κακὸς ὅς τέ νυ λαῶν,
ἠδ’ ὅς κ’ ἐσθλὸς ἔῃσι· κατὰ σφέας γὰρ μαχέονται·
γνώσεαι δ’ ἢ καὶ θεσπεσίῃ πόλιν οὐκ ἀλαπάζεις
ἦ ἀνδρῶν κακότητι καὶ ἀφραδίῃ πολέμοιο.”— 2, 361–368

c THE GREEKS MAKE A COMPACT WITH PRIAM

ἦ, καὶ ἀπὸ στομάχους ἀρνῶν τάμε νηλέι χαλκῷ.
καὶ τοὺς μὲν κατέθηκεν ἐπὶ χθονὸς ἀσπαίροντας
θυμοῦ δευομένους· ἀπὸ γὰρ μένος εἵλετο χαλκός·
οἶνον δ’ ἐκ κρητῆρος ἀφυσσόμενοι δεπάεσσιν
ἔκχεον, ἠδ’ εὔχοντο θεοῖς αἰειγενέτῃσιν.
ὧδε δέ τις εἴπεσκεν Ἀχαιῶν τε Τρώων τε,
“Ζεῦ κύδιστε μέγιστε, καὶ ἀθάνατοι θεοὶ ἄλλοι,
ὁππότεροι πρότεροι ὑπὲρ ὅρκια πημήνειαν,
ὧδέ σφ’ ἐγκέφαλος χαμάδις ῥέοι ὡς ὅδε οἶνος.”— 3, 292–300

6 Translate into Greek [Do not use rare or poetic constructions]:

a At first the soldiers refused to fight for they feared the power of the enemy, but finally they followed their leaders.

b If you happen to be present when he comes, tell him to come to me.

7 Write the Attic prose form for Ἀχιλλῆος (*a*, 1), δυνήσαι (*a*, 2), ἀνδροφόνοιο (*a*, 3), ἔσσεται (*b*, 1), φρήτρηφιν (*b*, 3), ἔῃσι (*b*, 6), δεπάεσσιν (*c*, 4), ἔκχεον (*c*, 5), αἰειγενέτῃσιν (*c*, 5), ὁππότεροι (*c*, 8).

8 State by whom and under what circumstances (*b*) was uttered. Give an account of the circumstances that led to the compact in (*c*).

9 Give the reason for the case of Ἀχιλλῆος (*a*, 1), ἥλοισι (*a*, 7), φύλοις (*b*, 3), κακότητι (*b*, 8), θυμοῦ (*c*, 3), Τρώων (*c*, 6); for the mode of πίπτωσι (*a*, 4), ἀρήγῃ (*b*, 3), πείθωνται (*b*, 4), ῥέοι (*c*, 9).

10 Classify the following participles: ἀχνύμενός (*a*, 2), θνήσκοντες (*a*, 4), πεπαρμένον (*a*, 7), δευομένους (*c*, 3). Explain the construction of χραισμεῖν (*a*, 3). Conjugate εἴπω (*b*, 1) in the voice, mode and tense here found. Decline ὅρκια (*c*, 8) in singular and plural.

11 From what verb is each of the following and where is the form found: χωόμενος (*a*, 5), γνώσῃ (*b*, 5), μαχέονται (*b*, 6), τάμε (*c*, 1), κατέθηκεν (*c*, 2)?

12 Write the principal parts of βάλε (*a*, 6), κρῖν' (*b*, 2), εὔχοντο (*c*, 5). Explain the force of the suffix in ἔνδοθι (*a*, 4), ἑτέρωθεν (*a*, 8).

13 Explain the force of ποτ' (*a*, 1), τοι (*b*, 1), γὰρ (*c*, 3). State the difference in use between ὡς (*b*, 3) and ὥς (*b*, 4). Give the force of the tense of ἔκχεον (*c*, 5).

14 Give the composition of each of the following words and the meaning of each part: ἀνδροφόνοιο (*a*, 3), ἀπόβλητον (*b*, 1), αἰειγενέτῃσιν (*c*, 5). Explain the reference in ἄριστον Ἀχαιῶν (*a*, 5); the figure in χαλκός (*c*, 3).

15 Scan the last *three* lines of (*b*), marking quantity of syllables, division into feet and principal cesuras. Define and illustrate synizesis, chiasmus.

High School Department

167TH EXAMINATION

GREEK—Second Year

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a GOOD FAITH OF AGESILAUS

Καὶ ταῦτα μὲν δὴ εἴρηται ὅσα τῶν ἐκείνου ἔργων μετὰ πλείστων μαρτύρων ἐπράχθη. Τὰ γὰρ τοιαῦτα οὐ τεκμηρίων προσδεῖται, ἀλλ' ἀναμνῆσαι μόνον ἀρκεῖ καὶ εὐθὺς πιστεύεται. Νῦν δὲ τὴν ἐν τῇ ψυχῇ αὐτοῦ ἀρετὴν πειράσομαι δηλοῦν, δι' ἣν ταῦτα ἔπραττε καὶ πάντων τῶν καλῶν ἤρα καὶ πάντα τὰ αἰσχρὰ ἐξεδίωκεν. Ἀγησίλαος γὰρ τὰ μὲν θεῖα οὕτως ἐσέβετο ὡς καὶ οἱ πολέμιοι τοὺς ἐκείνου ὅρκους καὶ τὰς ἐκείνου σπονδὰς πιστοτέρας ἐνόμιζον ἢ τὴν ἑαυτῶν φιλίαν· οἳ μὲν ὤκνουν εἰς ταὐτὸν ἰέναι, Ἀγησιλάῳ δὲ αὑτοὺς ἐνεχείριζον.—Xenophon, Agesilaus, 3

b GOVERNMENT OF THE THIRTY

Οἱ δὲ τριάκοντα ᾑρέθησαν μέν, ἐπεὶ τάχιστα τὰ μακρὰ τείχη καὶ τὰ περὶ τὸν Πειραιᾶ καθῃρέθη· αἱρεθέντες δὲ ἐφ' ᾧτε συγγράψαι νόμους, καθ' οὕστινας πολιτεύσοιντο, τούτους μὲν ἀεὶ ἔμελλον συγγράφειν τε καὶ ἀποδεικνύναι, βουλὴν δὲ καὶ τὰς ἄλλας ἀρχὰς κατέστησαν ὡς ἐδόκει αὐτοῖς. Ἔπειτα πρῶτον μὲν οὓς πάντες ᾔδεσαν ἐν τῇ δημοκρατίᾳ ἀπὸ συκοφαντίας ζῶντας καὶ τοῖς καλοῖς κἀγαθοῖς βαρεῖς ὄντας, συλλαμβάνοντες ὑπῆγον θανάτου· καὶ ἥ τε βουλὴ ἡδέως αὐτῶν κατεψηφίζετο οἵ τε ἄλλοι, ὅσοι συνῄδεσαν ἑαυτοῖς μὴ ὄντες τοιοῦτοι, οὐδὲν ἤχθοντο.—Hellenica, 2, 3

c THE WAY TO TRUE KNOWLEDGE

Ἡ ἀληθὴς Ἐπιστήμη, ἔφη, τῶν συμφερόντων, καὶ ἀσφαλὴς δόσις καὶ βεβαία καὶ ἀμετάβλητος. Φεύγειν οὖν κελεύει συντόμως πρὸς ταύτην· καὶ ὅταν ἔλθωσι πρὸς τὰς γυναῖκας ἐκείνας, ἃς καὶ πρότερον εἶπον ὅτι Ἀκρασία καὶ Ἡδυπάθεια καλοῦνται, καὶ ἐντεῦθεν κελεύει συντόμως ἀπαλλάττεσθαι—καὶ μὴ πιστεύειν μηδὲ ταύταις μηδὲν—ἕως ἂν πρὸς τὴν Ψευδοπαιδείαν ἀφίκωνται. Κελεύει οὖν αὐτοὺς χρόνον τινὰ ἐνδιατρῖψαι, καὶ λαβεῖν ὅ τι ἂν βούλωνται παρ' αὐτῆς, ὥσπερ ἐφόδιον.—Cebes, Tabula, 32

6 Translate into Greek:

a Though the thirty were chosen to compile and to publish the laws, they delayed doing it.

6 Translate into Greek:

a The lives of those who spend their time doing evil, will be wretched.

b If Agesilaus ever made a treaty he always kept it faithfully.

c The king swore that he would bring an army and money to the allies.

7 State the circumstances under which (*b*) was uttered. Explain the action of Lysander (*b*).

8 Give the reason for the case of ἀγγέλους (*a*, 4), αὐτῷ (*a*, 5), ἄρχουσι (*b*, 1), ἐμοῦ (*b*, 7), δεινῶν (*c*, 7), οἷς (*c*, 7); for the mode of ἐπιδείξειεν (*a*, 2), σπείσαιτο (*a*, 4), ἔλθοιεν (*a*, 4), βλάπτωμεν (*b*, 4).

9 Classify the following participles: ὁρισάμενος (*a*, 6), ἄξοντες (*b*, 6), ὄντα (*b*, 7), κατακεκρατημένοι (*c*, 4). Give the syntax of διαπράξεσθαι (*a*, 4), πράττειν (*a*, 8), εἶναι (*b*, 2), ἐξηγεῖσθαι (*b*, 3), ἐκλῦσαι (*c*, 6), ἀφικέσθαι (*c*, 7).

10 From what verb is each of the following and where is the form found: διηγήσαιτο (*a*, 2), ἀφεθῆναι (*a*, 5), πεπονθέναι (*b*, 3), ὑπολαβοῦσαι (*c*, 1), σωθῆναι (*c*, 7)?

11 Write the principal parts of ὤμοσεν (*a*, 7), ἔπεμψα (*b*, 5), πεῖσαι (*b*, 8), διατρίβοντας (*c*, 2), ταράττονται (*c*, 7).

12 Conjugate ἐγένετο (*a*, 3), δέδενται (*c*, 7) in the voice, mode and tense here found. Write the first form of each mode including participle of ἀξιῶ (*b*, 2) in the voice and tense here found. Compare κακῶς (*c*, 2).

13 Give the force of τοίνυν (*a*, 2), ἤδη (*b*, 3). Give the force of the voice of πείθεσθαι (*b*, 1). Give the correlatives of οἱ μὲν (*c*, 4).

14 Translate into Greek: The Milesians who dwelt among the barbarians had suffered much harm at their hands and therefore were most eager for war; but the Lacedaemonians could not fight till they should receive the money for which they had sent.

15 Explain the composition of each of the following and the meaning of each part: αὐτονόμους (*a*, 5), προθυμοτάτους (*b*, 2), Φιλαργυρίας (*c*, 5). Explain the reference in τὰς . . . πόλεις Ἑλληνίδας (*a*, 5), αἱ Ἀρεταὶ (*c*, 1).

High School Department

167TH EXAMINATION

GREEK—Third Year

Thursday, January 24, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *f more than four of the others are answered only the first four answers vill be considered. Each complete answer will receive 10 credits. Papers ntitled to 75 or more credits will be accepted.*

1–5 Translate into English:

EURYMACHUS QUESTIONS TELEMACHUS

Τὸν δ' αὖτ' Εὐρύμαχος, Πολύβου παῖς, ἀντίον ηὔδα·
"Τηλέμαχ', ἦ τοι ταῦτα θεῶν ἐν γούνασι κεῖται,
ὅς τις ἐν ἀμφιάλῳ Ἰθάκῃ βασιλεύσει Ἀχαιῶν·
κτήματα δ' αὐτὸς ἔχοις καὶ δώμασι σοῖσιν ἀνάσσοις.
μὴ γὰρ ὅ γ' ἔλθοι ἀνὴρ ὅς τίς σ' ἀέκοντα βίηφι
κτήματ' ἀποῤῥαίσει, Ἰθάκης ἔτι ναιετοώσης.
ἀλλ' ἐθέλω σε, φέριστε, περὶ ξείνοιο ἐρέσθαι,
ὁππόθεν οὗτος ἀνήρ, ποίης δ' ἐξ εὔχεται εἶναι
γαίης."—Homer, Odyssey, 1, 399–407

ἀποῤῥαίω=deprive of, ναιετάω=exist

CYRUS IS SENT FOR BY HIS FATHER

Καμβύσης δὲ ὁ τοῦ Κύρου πατὴρ ἥδετο μὲν πυνθανόμενος ταῦτα, ἐπεὶ δ' ἤκουσεν ἔργα ἀνδρὸς ἤδη διαχειριζόμενον τὸν Κῦρον, ἀπεκάλει. Καὶ ὁ Κῦρος δὲ ἐνταῦθα λέγεται εἰπεῖν ὅτι ἀπιέναι βούλοιτο, μὴ ὁ πατήρ τι ἄχθοιτο καὶ ἡ πόλις μέμφοιτο· καὶ τῷ Ἀστυάγει δὲ ἐδόκει εἶναι ἀναγκαῖον ἀποπέμπειν αὐτόν. Ἔνθα δὴ ἵππους τε αὐτῷ δοὺς οὓς αὐτὸς ἐπεθύμει λαβεῖν καὶ ἄλλα συσκευάσας πολλὰ ἔπεμπε καὶ διὰ τὸ φιλεῖν αὐτὸν καὶ ἅμα ἐλπίδας ἔχων μεγάλας ἐν αὐτῷ ἄνδρα ἔσεσθαι ἱκανὸν καὶ φίλους ὠφελεῖν καὶ ἐχθροὺς ἀνιᾶν.—Xenophon, Cyropaedia, 1, 4

διαχειρίζω=engage in, μέμφομαι=blame, ἀνιάω=annoy

BELIEF OF SOCRATES IN THE GODS

Καὶ γὰρ ἐπιμελεῖσθαι θεοὺς ἐνόμιζεν ἀνθρώπων, οὐχ ὃν τρόπον οἱ πολλοὶ νομίζουσιν· οὗτοι μὲν γὰρ οἴονται τοὺς θεοὺς τὰ μὲν εἰδέναι, τὰ δ' οὐκ εἰδέναι· Σωκράτης δὲ πάντα μὲν ἡγεῖτο θεοὺς εἰδέναι, τά τε λεγόμενα και πραττόμενα καὶ τὰ σιγῇ βουλευόμενα, πανταχοῦ δὲ παρεῖναι, καὶ σημαίνειν τοῖς ἀνθρώποις περὶ τῶν ἀνθρωπείων πάντων.

Θαυμάζω οὖν, ὅπως ποτὲ ἐπείσθησαν Ἀθηναῖοι Σωκράτην περὶ τοὺς θεοὺς μὴ σωφρονεῖν, τὸν ἀσεβὲς μὲν οὐδέν ποτε περὶ τοὺς θεοὺς οὔτ' εἰπόντα οὔτε πράξαντα, τοιαῦτα δὲ καὶ λέγοντα καὶ πράττοντα περὶ θεῶν, οἷά τις ἂν καὶ λέγων καὶ πράττων εἴη τε καὶ νομίζοιτο εὐσεβέστατος.

—Memorabilia, 1, 1

σιγῇ=silently, σωφρονέω=be sound minded, εὐσεβής=pious

6 Translate into Greek: If Cyrus had not departed when his father sent for him, his friends would have blamed him and would have said that he did not love his father.

7 Give the reason for the case of δώμασι (*a*, 4), βίηφι (*a*, 5), ἀνθρώπων (*c*, 1); for the mode of ἔλθοι (*a*, 5), βούλοιτο (*b*, 3), ἄχθοιτο (*b*, 4), εἰδέναι (*c*, 2), εἴη (*c*, 9). Classify the following participles: πυνθανόμενος (*b*, 1), λέγων (*c*, 9).

8 Translate into Greek: The strangers were so powerful that it seemed necessary to send a force to aid those who wished to go away. It was thought that this force could take care of everything, men, horses and property.

9 Translate into English:

Ὁ δὲ Ξενοφῶν ἀκούσας ταῦτα εἶπεν· Ἀλλὰ σοὶ μὲν τοιαῦτα λέγοντι καὶ ἀποκρίνασθαι χαλεπόν. Ἡμεῖς μὲν γάρ, ἔφη, πρὶν ὑμῖν φίλοι γενέσθαι, ἐπορευόμεθα διὰ ταύτης τῆς χώρας ὅποι ἐβουλόμεθα. Ἐπεὶ δὲ ἡμῖν φίλοι ἐγένεσθε, νῦν δὴ ἐξελαύνετε ἡμᾶς ἐκ τῆσδε τῆς χώρας ἣν παρ' ἡμῶν παρελάβετε.
—Xenophon, Anabasis, 7, 7

10 Translate into English:

Ἐπεὶ δὲ ὁ Τισσαφέρνης παρὰ βασιλέως προεῖπεν Ἀγησιλάῳ πόλεμον, εἰ μὴ ἀπίοι ἐκ τῆς Ἀσίας, οἱ ἄλλοι σύμμαχοι καὶ Λακεδαιμονίων οἱ παρόντες μάλα ἀχθεσθέντες φανεροὶ ἐγένοντο, νομίζοντες ἐλάττω τὴν παροῦσαν εἶναι δύναμιν Ἀγησιλάῳ τῆς βασιλέως παρασκευῆς.—Hellenica, 3, 4

11 Translate into Greek: *a*) Because of his power he thought he could become king, *b*) He collected his soldiers and marched against his brother, *c*) He went to report this to the general.

12 Translate into English:

Δηΐφοβον δ' ἐκάλει λευκάσπιδα, μακρὸν ἀΰσας,
ᾔτεέ μιν δόρυ μακρόν· ὁ δ' οὔ τι οἱ ἐγγύθεν ἦεν.
Ἕκτωρ δ' ἔγνω ᾗσιν ἐνὶ φρεσί, φώνησέν τε·
Ὢ πόποι, ἦ μάλα δή με θεοὶ θάνατόνδε κάλεσσαν·
Δηΐφοβον γὰρ ἔγωγ' ἐφάμην ἥρωα παρεῖναι.—Homer, Iliad, 22, 294–298

13 Translate into English:

Οὐδὲν γὰρ ἄλλο πράττων ἐγὼ περιέρχομαι ἢ πείθων ὑμῶν καὶ νεωτέρους καὶ πρεσβυτέρους μήτε σωμάτων ἐπιμελεῖσθαι μήτε χρημάτων οὕτω σφόδρα ὡς τῆς ψυχῆς, λέγων ὅτι οὐκ ἐκ χρημάτων ἀρετὴ γίγνεται, ἀλλ' ἐξ ἀρετῆς χρήματα καὶ τἆλλα ἀγαθὰ τοῖς ἀνθρώποις ἅπαντα.—Plato, Apology, 17

14 Write Greek sentences illustrating *three* of the following: genitive with adverbs, prohibition, participle in indirect discourse, object clause after a verb of fearing, asyndeton.

15 Give an account of *two* of the following: Xenophon, Apollo, Telemachus, Alcibiades.

High School Department

169TH EXAMINATION

GREEK—Third Year

Thursday, June 20, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a ODYSSEUS SETS SAIL

Αὐτὰρ ἐπεί ῥ' ἐπὶ νῆα κατήλθομεν ἠδὲ θάλασσαν,
νῆα μὲν ἂρ πάμπρωτον ἐρύσσαμεν εἰς ἅλα δῖαν,
ἐν δ' ἱστὸν τιθέμεσθα καὶ ἱστία νηὶ μελαίνῃ,
ἐν δὲ τὰ μῆλα λαβόντες ἐβήσαμεν, ἂν δὲ καὶ αὐτοὶ
βαίνομεν ἀχνύμενοι, θαλερὸν κατὰ δάκρυ χέοντες.
ἡμῖν δ' αὖ μετόπισθε νεὸς κυανοπρῴροιο
ἴκμενον οὖρον ἵει πλησίστιον, ἐσθλὸν ἑταῖρον,
Κίρκη ἐυπλόκαμος, δεινὴ θεὸς αὐδήεσσα.—Homer, Odyssey, 11, 1–8

μῆλον=sheep, κυανόπρῳρος=dark-prowed, πλησίστιος=sail-filling, αὐδήεις=using mortal speech

b AGESILAUS DETERMINES TO AID SPARTA

Ὁ δ' ἐπεὶ ἀφίκετο, τά τε ἄλλα διηγεῖτο ὡς ἔχοι καὶ ὅτι ἡ πόλις ἐπιστέλλοι αὐτῷ βοηθεῖν ὡς τάχιστα τῇ πατρίδι. Ὁ δὲ Ἀγησίλαος ἐπεὶ ἤκουσε, χαλεπῶς μὲν ἤνεγκεν, ἐνθυμούμενος καὶ οἵων τιμῶν καὶ οἵων ἐλπίδων ἀπεστερεῖτο, ὅμως δὲ συγκαλέσας τοὺς συμμάχους ἐδήλωσε τὰ ὑπὸ τῆς πόλεως παραγγελλόμενα, καὶ εἶπεν ὅτι ἀναγκαῖον εἴη βοηθεῖν τῇ πατρίδι. Ἀκούσαντες δὲ ταῦτα πολλοὶ μὲν ἐδάκρυσαν, πάντες δ' ἐψηφίσαντο βοηθεῖν μετ' Ἀγησιλάου τῇ Λακεδαίμονι· εἰ δὲ καλῶς τἀκεῖ γένοιτο, λαβόντες αὐτὸν πάλιν ἥκειν εἰς τὴν Ἀσίαν. Καὶ δὴ συνεσκευάζοντο ὡς ἀκολουθήσοντες.—Xenophon, Hellenica, 4, 2

διηγέομαι=relate, ψηφίζομαι=vote

c GENEROSITY OF CYRUS

Καὶ Κῦρον δὲ αὐτὸν λέγεται σὺν πολλοῖς δακρύοις ἀποχωρῆσαι. Πολλὰ δὲ δῶρα διαδοῦναί φασιν αὐτὸν τοῖς ἡλικιώταις ὧν Ἀστυάγης αὐτῷ ἐδεδώκει, τέλος δὲ καὶ ἣν εἶχε στολὴν τὴν Μηδικὴν ἐκδύντα δοῦναί τινι. Τοὺς μέντοι λαβόντας καὶ δεξαμένους τὰ δῶρα λέγεται Ἀστυάγει ἀπενεγκεῖν, Ἀστυάγην δὲ δεξάμενον Κύρῳ ἀποπέμψαι, τὸν δὲ πάλιν τε ἀποπέμψαι εἰς Μήδους καὶ εἰπεῖν, Εἰ βούλει, ὦ πάππε, ἐμὲ καὶ αὖθις ἰέναι ὡς σὲ μὴ αἰσχυνόμενον, ἔα ἔχειν εἴ τῳ τι ἐγὼ δέδωκα· Ἀστυάγην δὲ ταῦτα ἀκούσαντα ποιῆσαι ὥσπερ Κῦρος ἐπέστειλεν.—Xenophon, Cyropaedia, 1, 4

ἡλικιώτης=companion, στολή=dress, ἐκδύω=take off

6 Translate into Greek: *a*) It seems to me that he would be ashamed if no one should come to aid him, *b*) He said that he would consider what he could do, *c*) Do not deprive us of hope,

7 Give the reason for the case of *νηὶ* (*a*, 3), *ἡμῖν* (*a*, 6), *πατρίδα* (*b*, 2), *ἐλπίδων* (*b*, 3), *ὧν* (*c*, 2); for the mode of *ἐπιστέλλοι* (*b*, 1), *γένοιτο* (*b*, 7), *βούλει* (*c*, 6), *ποιῆσαι* (*c*, 8). Explain the use of the participle *ἀκολουθήσοντες* (*b*, 9).

8 Translate into Greek: *a*) Cyrus told his grandfather that he wished his companions to keep the gifts that he had given them, *b*) It is said that Astyages always did whatever Cyrus wished.

9 Translate into English:

"Οὐκοῦν," ἔφη ὁ Σωκράτης, "εἴ γε ταῦτα τοιαῦτά ἐστι, καλῶς ἂν ἔχοι ἐξετάζειν τινὰ ἑαυτὸν, πόσου ἄρα τυγχάνει τοῖς φίλοις ἄξιος ὤν, καὶ πειρᾶσθαι ὡς πλείστου ἄξιος εἶναι, ἵνα ἧττον αὐτὸν οἱ φίλοι προδιδῶσιν· ἐγὼ γάρ τοι," ἔφη, "πολλάκις ἀκούω τοῦ μὲν, ὅτι προὔδωκεν αὐτὸν φίλος ἀνὴρ, τοῦ δὲ, ὅτι μνᾶν ἀνθ' ἑαυτοῦ μᾶλλον εἵλετο ἀνὴρ, ὃν ᾤετο φίλον εἶναι."

—Xenophon, Memorabilia, 2, 5

ἐξετάζω=examine, *μνᾶ*=mina

10 Translate into English:

Ἐπεὶ δὲ τὰ ἐπιτήδεια οὐκέτι ἦν λαμβάνειν ἐκ τούτου λαβὼν ὁ Ξενοφῶν ἡγεμόνας τῶν Τραπεζουντίων ἐξάγει τὸ ἥμισυ τοῦ στρατεύματος, τὸ δὲ ἥμισυ κατέλιπε φυλάττειν τὸ στρατόπεδον· οἱ γὰρ Κόλχοι ἦσαν ἀθρόοι καὶ ὑπερεκάθηντο ἐπὶ τῶν ἄκρων. Οἱ δὲ Τραπεζούντιοι ὁπόθεν μὲν τὰ ἐπιτήδεια ῥᾴδιον ἦν λαβεῖν οὐκ ἦγον· φίλοι γὰρ αὐτοῖς ἦσαν.

—Xenophon, Anabasis, 5, 2

11 Translate into Greek: He came as quickly as possible in order that he might lead the army which happened to be preparing to march against the king.

12 Translate into English:

ἐκ δ' ἐγέλασσε πατήρ τε φίλος καὶ πότνια μήτηρ.
αὐτίκ' ἀπὸ κρατὸς κόρυθ' εἵλετο φαίδιμος Ἕκτωρ,
καὶ τὴν μὲν κατέθηκεν ἐπὶ χθονὶ παμφανόωσαν·
αὐτὰρ ὅ γ' ὃν φίλον υἱὸν ἐπεὶ κύσε πῆλέ τε χερσίν,
εἶπεν ἐπευξάμενος Διί τ' ἄλλοισίν τε θεοῖσιν.—Homer, Iliad, 6, 471–475

φαίδιμος=illustrious, *κυνέω*=kiss

13 Translate into English:

Καὶ οὗτος μὲν ἀπέπλει· οἱ δὲ στρατιῶται, διαθέμενοι τὸν σῖτον ὃν ἦσαν συγκεκομισμένοι καὶ τἆλλα ἃ εἰλήφεσαν, ἐξεπορεύοντο διὰ τῶν Βιθυνῶν. Ἐπεὶ δὲ οὐδενὶ ἐνέτυχον πορευόμενοι τὴν ὀρθὴν ὁδόν, ἔδοξεν αὐτοῖς τοὔμπαλιν ὑποστρέψαντας ἐλθεῖν μίαν ἡμέραν καὶ νύκτα. Τοῦτο δὲ ποιήσαντες ἔλαβον πολλὰ καὶ ἀνδράποδα καὶ πρόβατα.—Xenophon, Anabasis, 6, 6

συγκομίζω=collect, *πρόβατον*=sheep

14 Give an account of *two* of the following: Hector, Athena, expedition of the 10,000, adventures of Odysseus after the fall of Troy.

15 Write Greek sentences illustrating *three* of the following: verbal adjective, potential optative, wish, accusative absolute, gnomic aorist.

High School Department

167TH EXAMINATION

GREEK PROSE COMPOSITION

Wednesday, January 23, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Translate into Greek:

1 Send for your brother and urge him to come as quickly as possible with all his forces.

2 The river must be crossed in order that we may reach the mountains while the army of the enemy is unprepared.

3 Let us fight bravely, and if need be, let us die for our homes, our country and our honor.

4 The general became leader not only of the Greeks but also of many of the barbarians because he gave them liberty.

5 He will not leave this city till he has money and ships for the army.

6–7 When Cyrus saw that the Greeks were conquering and were pursuing the enemy, he was pleased and rushed against the king. While he was striking the king some one wounded him in the eye and he died fighting.

8–9 The herald spoke as follows: "Citizens, why do you drive us away? Why do you wish to kill us? For we have never done you any harm, but we have been your allies and have shared with you both freedom and safety."

10–12 The soldiers choose men and send them to ask Cyrus what he intends to do. Cyrus replies that he is going to the Euphrates river because he has heard that many of the enemy are there. He promises the soldiers large pay if they will go with him. The messengers report these things and the soldiers finally consent to go.

13–15 Tissaphernes said that he would make war on the Greeks unless Agesilaus left Asia. On hearing this the allies of the Greeks were vexed thinking that the force of Tissaphernes was better than theirs. Agesilaus, on the other hand, said that the gods were his allies but the enemies of the Persians because Tissaphernes had violated his oath.

unprepared=*ἀπαράσκευος*, home=*οἶκος*, liberty=*ἐλευθερία*, rush=*ἵεμαι*, strike=*παίω*, ally=*σύμμαχος*, share=*μετέχω*, finally=*τέλος*, be vexed=*ἄχθομαι*, violate an oath=*ἐπιορκέω*

High School Department

169TH EXAMINATION

GREEK PROSE COMPOSITION

Wednesday, June 19, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Translate into Greek:

1 Whoever is brave and good and just will be honored by both friends and enemies.

2 Without men and horses, we can not hope to conquer in battle.

3 Unless we advance rapidly and guard our wagons and provisions zealously, we shall be attacked by the king's army.

4 The general knew that the country would not long be able to support an army.

5 A messenger was sent to the soldiers to say that they must leave the city at once.

6–7 Clearchus said, "If we must be friends of the king, we shall be more valuable friends with our arms than without them; if we must fight, we shall be better able to fight if we have our arms than if we give them up to the Persians."

8–9 Of his friends, Agesilaus loved most not those who were most powerful but those who were most zealous. He hated men who were ungrateful. He rejoiced to see the just becoming rich and the unjust becoming poor. He always wished to make justice more profitable than injustice.

10–12 Tissaphernes came to the Grecian camp with a message from the king. The generals replied, but Clearchus was spokesman. He said that the Greeks had come not as enemies of the king but as friends of Cyrus. Because Cyrus had formerly benefited them, they were ashamed to betray him when they found out that he was marching against the king.

13–15 Because the Lacedaemonians had asked Cyrus for money, he came to them with five hundred talents. If he had had no money, he would willingly have cut up his throne, which was of gold and silver, and would have given it to them. When the Lacedaemonians praised him, he said that he could not have done otherwise as his father had charged him to be a friend to them.

zealously=*προθύμως*, support=*τρέφω*, hate=*μισέω*, poor=*πένης*, profitable=*κερδαλέος*, benefit=*εὖ ποιέω*, charge=*ἐπιστέλλω*

High School Department

165TH EXAMINATION

LATIN—First Year

August 1900—Three hours, only

Answer 10 questions but **no more,** *including at least one translation into English and one translation into Latin. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Indicate the division into syllables and the accent of *three* of the following words: *corporis*, *pulchrorum*, *urbium*, *regebat*. Explain the formation of the following nominatives: *pes*, *civitas*, *rex*, *mater*.

2 Decline the following nouns: *gladius*, *res*, *iter*, *passus*, *finis*.

3 Translate into English:

Cum *finem* oppugnandi nox *fecisset*, Iccius Remus, summa *nobilitate* et gratia inter suos, qui tum oppido praefuerat, unus ex iis, qui de pace ad Caesarem *venerant*, nuntium ad eum mittit, qui *dicat sese* diutius sustinere non *posse*.

4 Give the reason for the case of *finem*, *nobilitate*, *sese;* for the mode of *fecisset*, *dicat*.

5 Translate into Latin:

a This man is braver than his brother.

b Let us go to Caesar with the tenth legion.

c That very high mountain is five miles distant.

d He orders the soldiers to fortify the camp.

e Caesar says that Labienus is leading a large army.

6 Conjugate *fecisset* (question 3) in the future indicative active; *venerant* in the imperfect subjunctive active; *dicat* in the perfect subjunctive passive; *posse* in the imperfect indicative.

7 Form and compare an adverb from *each* of the following adjectives: *miser*, *brevis*, *facilis*, *multus*, *latus*.

8 Translate into English:

Octavius in Italiam rediit, Romamque triumphans ingressus est. Tum bellis toto orbe compositis, Iani portas sua manu clausit, quae bis antea clausae erant, primo sub Numa rege, iterum post primum Punicum bellum.

redeo = return, *ingredior* = enter, *compono* = settle, *claudo* = close

9 Translate into Latin:

a Caesar intends to occupy the town.

b Did you see the girl who gave me the gift?

c We must capture the Helvetian army.

d He says that he is unwilling to go home.

e He sends his forces to destroy the city.

10 Write the third person singular of *each* of the tenses of the indicative and subjunctive of *fio*.

11 Decline in all genders *a*) *hic* in the singular, *b*) *qui* in the plural, *c*) *levis* throughout.

12 Write the principal parts of *habeo*, *do*, *gero*, *recipio*, *fero*.

13 Translate into English:

Hac pugna pugnata Hannibal Romam profectus est. Cum aliquot ibi dies castra habuisset et Capuam reverteretur, Q. Fabius Maximus, dictator Romanus, in agro Falerno ei se obiecit.

aliquot = some, *obicio* = oppose

14 From the Latin passage in question 13, select *a*) a noun in apposition, *b*) an ablative absolute, *c*) a direct object, *d*) an indirect object, *e*) an accusative of duration of time.

15 Write all the infinitives and participles of *rego*. [Translate each form].

High School Department

166TH EXAMINATION

LATIN—First Year

Tuesday, September 25, 1900—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least one translation into English and one translation into Latin. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Mark the division into syllables and the accent of *each* of the following words: *puero*, *hostibus*, *filiorum*, *templum*, *amicus*, *terraque*, *adest*, *dixerunt*, *tenebat*, *veniret.*

2 Decline *spes*, *proelium*, in the singular; *manus*, *miles*, *corpus*, in the plural.

3 Translate into English:

Prima *luce*, cum summus mons a *Labieno teneretur*, et Caesar ab hostium castris non longius mille et quingentis *passibus* abesset, Considius ad eum accurrit et dicit *montem* ab hostibus teneri. Caesar suas copias in proximum collem subducit aciemque instruit.

accurro = hasten, *subduco* = withdraw

4 Give the reason for the case of *luce*, *Labieno*, *passibus*, *montem;* for the mode of *teneretur.*

5 Translate into Latin:

a The soldiers were fighting with swords.

b We must conquer the enemy

c The general went to lead the army into Gaul.

d He says that he will come with all his forces.

e They were men of great courage.

6 Conjugate *nolo* in the present and the perfect indicative; *possum* in the future indicative, in the pluperfect subjunctive.

7 Translate into English:

Anno quarto decimo postquam in Italiam Hannibal *venerat*, Scipio consul *est factus* et in Africam missus. Is in Africa contra Hannonem, ducem Afrorum, *pugnat* atque exercitum eius delet. Secundo proelio castra *capit* cum multis militibus.

Afer = an African

9 Translate into Latin:

a Two battles were fought by the Romans.

b He sends a ship to capture the island.

c We must destroy this city.

d He will lead a large army into Italy.

e Take the books that I have.

10 Decline the gerund of *audio*. Compare *malus*, *celer*, *brevis*. Form an adverb from *carus*, *levis*.

11 Write the principal parts of *mitto*, *doceo*, *pugno*, *scio*, *facio*.

12 Decline in the singular *is altior vir*, *quidam miles*.

13 Give all the infinitives, active and passive, of *rego*. Define and illustrate *penult*, *enclitic*.

14 Translate into English:

Quattuor dies Xerxes cum multis milibus hominum exspectavit; quinto die, cum Leonidas copias non abduxisset, proelium commisit. Sed magnus numerus Persarum aut vulneratus aut interfectus a Graecis cecidit; reliqui fugerunt.

15 From the Latin passage in question 14, select *a*) a direct object, *b*) an ablative of accompaniment, *c*) an accusative of duration of time, *d*) an ablative of the agent, *e*) a partitive genitive.

High School Department

168TH EXAMINATION

LATIN—First Year

Friday, March 29, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least one translation into English and one translation into Latin. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Indicate the division into syllables and the accent of *five* of the following words: *temporis*, *finium*, *diebus*, *magistri*, *abest*, *puellarum*, *miserunt*, *amabimini.*

2 Translate into English:

Postquam omnes Belgarum copiae in *unum locum venerunt*, Caesar flumen, *quod* est in hostium finibus, exercitum transduxit atque ibi castra *posuit.* In *eo flumine* pons erat. Ibi Caesar unam legionem et in altera parte fluminis duas legiones reliquit.

Belgae=Belgians, *pons*=bridge

3 Conjugate *venerunt* in the imperfect indicative active, in the imperfect subjunctive active; *posuit* in the future indicative passive, in the pluperfect subjunctive passive.

4 Decline in the singular *unum locum*, *eo flumine*, the masculine of *quod.*

5 Translate into Latin:

a Caesar is not able to send the cavalry.

b Soldiers, let us capture this city.

c The road from the city is very wide.

d I must write a letter to my friend.

e Three legions were left at Rome by the commander.

6 Write the third person singular of *each* of the tenses of the indicative and subjunctive of *volo.*

7 Translate into English:

Cum Xerxes in Europam maximis copiis *transisset*, Leonidas cum septem milibus *hominum* missus est, ut Thermopylas *occuparet.* Ii *vim* hostium sustinere non potuerunt et eo loco omnes interierunt. Post hoc proelium Xerxes *Athenas* venit atque urbem delevit.

Thermopylae=Thermopylae, *intereo*=perish

8 Give the reason for the case of *hominum*, *vim*, *Athenas*; for the mode of *transisset*, *occuparet*.

9 Decline *deus*, *eques*, in the singular; *vis*, *pugna*, *impetus*, in the plural.

10 Translate into Latin:

a He says that he is a poet.

b Who will come to lead the army?

c The soldiers will bring their children to the camp.

d Our forces fought with the enemy six hours.

e The girl whom you saw has returned home.

11 Compare *gravis*, *parvus*, *similis*. Form an adverb from *altus*, *celer*. Compare the adverb formed from *altus*.

12 Write all the infinitives and participles, active and passive (including gerundive), of *moneo*.

13 Write the principal parts of *iubeo*, *do*, *facio*, *impero*, *ago*.

14 Translate into English:

Erat inter Graecos, qui urbem Troiam obsidebant, Ulixes, vir summae virtutis ac prudentiae. Hic regnum insulae Ithacae obtinuerat et cum reliquis Graecis Troiam profectus erat. Troia tandem capta, domum redire maturavit. De hoc reditu Homerus, maximus poeta Graecorum, scripsit.

Troia=Troy, *obsideo*=besiege, *obtineo*=hold, *reliquus*=rest of, *maturo*=hasten, *reditus*=return

15 Write original Latin sentences illustrating *three* of the following: genitive of possession, ablative of means, accusative of extent of space, clause of result, temporal clause.

High School Department

169TH EXAMINATION

LATIN—First Year

Tuesday, June 18, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least one translation into English and one translation into Latin. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Indicate the accent and the gender of *each* of the following: *filia*, *October*, *victoribus*, *corporum*, *fluminis*, *civitas*, *Tiberis* (the Tiber river), *regina*, *malus* (apple-tree). Indicate the accent of *bellaque*.

2 Decline *senex*, *ager*, *caput* in the singular; *collis*, *cornu* in the plural.

3 Translate into English:

Postero *die* Helvetii castra ex eo loco moverunt. *Idem* Caesar fecit, equitesque *videre* quam in partem hostes iter faciant iussit. Cum Romani hostes tria *milia* passuum *secuti essent* proelium cum eis commiserunt; et pauci de nostris ceciderunt.

cado=fall

4 Give the reason for the case of *die*, *idem*, *milia;* for the mode of *videre*, *secuti essent*.

5 Translate into Latin:

a The cavalry had fought in that place.

b If the Helvetians move from their camp the enemy will do the same.

c Have not the Romans marched ten miles?

d Caesar says that a few of his men fell.

e The cavalry will follow the enemy to the river.

6 Write the second person singular of *each* of the tenses of the indicative and subjunctive of *malo*.

7 Translate into English:

Athenienses bellum hostibus indixerunt. Ad hoc bellum gerendum Alcibiades dux delectus est atque duo collegae ei *dati sunt*. Priusquam classis *exiret*, omnes Hermae qui erant Athenis una nocte deiecti sunt.

indico=declare, *deligo*=choose, *collega*=colleague, *Hermae*=statues of Mercury, *deicio*=throw down

8 Conjugate *exiret* in the imperfect indicative active, in th present subjunctive active; *dati sunt* in the future indicativ active, in the pluperfect subjunctive passive.

9 Translate into Latin:

a This army must be sent to Rome.

b The town is defended by the bravest soldiers.

c So great were the forces of the enemy that the Athe ians left the place.

d Hannibal was a general of great skill.

e He is not able to remain in Rome.

10 Compare *audax*, *magnus*, *ingens*, *fortiter*, *bene*.

11 Write the principal parts of *capio*, *deleo*, *regno*, *venio*, *fer*

12 Decline *acer* in the plural in all genders; *nulla nox* i the singular.

13 Write the active infinitives of *teneo;* all the particip (including gerundive) of *utor*.

14 Translate into English:

Hostes Regulum ducem, quem ceperant, Romam miserun ut a senatu pacem obtineret. Ille, cum venisset, dixit se n iam esse civem Romanum, et senatui persuasit ne pacem facere Cum ad Africam rediit summa crudelitate interfectus est.

Regulus=Regulus, *obtineo*=obtain, *crudelitas*=cruelty

15 From the Latin passage in question 14, select *a*) an acc sative subject of an infinitive, *b*) an accusative of limit of m tion, *c*) a noun in apposition, *d*) a subjunctive of purpose, *e*) ablative of manner.

High School Department

167TH EXAMINATION

CAESAR'S COMMENTARIES

Tuesday, January 22, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1-5 Translate into English:

1 CAESAR ENCAMPS NEAR ARIOVISTUS

Ubi eum castris se tenere Caesar *intellexit*, ne *diutius commeatu prohiberetur*, ultra eum locum, quo in loco Germani consederant, circiter *passus* sexcentos ab his, *castris* idoneum locum delegit acieque triplici instructa ad eum locum venit. Primam et secundam aciem in armis *esse*, tertiam castra munire iussit. Hic locus ab hoste circiter passus sexcentos, uti dictum est, aberat. Eo circiter hominum *numero* sedecim *milia* expedita cum omni equitatu Ariovistus misit quae copiae nostros *perterrerent* et munitione *prohiberent*.—1, 49

THE AQUITANIANS ARE UNWILLING TO JOIN BATTLE

Prima *luce* productis omnibus copiis, duplici acie instituta, uxiliis in mediam aciem coniectis, *quid* hostes *consilii caperent* xspectabat. Illi etsi propter multitudinem et veterem belli loriam paucitatemque nostrorum se tuto *dimicaturos* existi- abant, tamen tutius esse arbitrabantur obsessis viis commeatu tercluso sine ullo *vulnere victoria potiri*, et si propter *inopiam* ei frumentariae Romani sese recipere coepissent, impeditos in gmine et sub sarcinis infirmiore *animo adoriri* cogitabant.

—3, 24

CAESAR'S FLEET IS DAMAGED BY A STORM

His *rebus pace* confirmata post diem quartum quam est in ritanniam ventum, *naves* octodecim, de quibus supra demon- ratum est, quae *equites sustulerant*, ex superiore portu leni ento solverunt. Quae cum appropinquarent Britanniae et ex stris *viderentur*, tanta tempestas subito coorta est ut nulla rum cursum *tenere posset*, sed aliae eodem unde erant pro- ctae *referrentur*, aliae ad *inferiorem* partem *insulae*, quae est opius solis occasum, magno sui cum periculo deicerentur.

—4, 28

6 Translate into Latin [Do not use rare or poetic constructions]:

a The cavalry advanced in order that the Belgians might not obtain supplies.

b We fear that a great storm will destroy the ships.

c Caesar must send Labienus to the Remi with horsemen.

7 Translate into Latin [Do not use rare or poetic constructions]:

a When Caesar was informed that the Germans were six miles distant, he fortified the camp.

b He made peace with the Gauls before he crossed into Britain.

c The wind was so mild that the ships could not leave the harbor.

8 Give the reason for the case of *commeatu* (*a*), *castris* (*a*, line 3), *luce*, *animo* (*b*), *rebus* (*c*); for the mode of *prohiberetur*, *esse* (*a*), *caperent*, *potiri* (*b*), *posset* (*c*).

9 Write the principal parts of *intellexit*, *perterrerent* (*a*), *caperent*, *adoriri* (*b*), *sustulerant* (*c*).

10 Translate into English: Helvetiorum legati dixerunt: *sibi esse* in animo sine ullo maleficio iter per provinciam facere propterea quod aliud iter haberent *nullum*.

Rewrite *sibi esse* . . . *nullum* in direct discourse.

11 Give the reason for the case of *numero* (*a*), *quid*, *consilii*, *victoria* (*b*), *pace* (*c*); for the mode of *intellexit*, *perterrerent* (*a*), *dimicaturos* (*b*), *viderentur*, *tenere* (*c*).

12 Compare *diutius* (*a*), *inferiorem* (*c*). Decline, in singular and plural, *passus* (*a*), *vulnere* (*b*), *equites* (*c*).

13 Write an account of *one* of the following: *a*) the war with Ariovistus, *b*) the war with the Nervii, *c*) the Helvetian war.

14 Illustrate by original Latin sentences *a*) the active periphrastic conjugation, *b*) the genitive of value, *c*) the dative of possession, *d*) the comparative degree followed by *quam*, *e*) prohibition.

15 Give, with meaning of prefix and root, the composition of *prohiberent* (*a*), *inopiam* (*b*), *referrentur* (*c*). Give an English word derived from the stem of *milia* (*a*), *vulnere* (*b*), *naves*, *insulae* (*c*).

High School Department

168TH EXAMINATION

CAESAR'S COMMENTARIES

Friday, March 29, 1901 — 1.15 to 4.15 p. m., only

ıswer the first six questions and four of the others but **no more.** *If than four of the others are answered only the first four answers be considered. Each complete answer will receive 10 credits. Papers led to 75 or more credits will be accepted.*

·5 Translate into English:

THE HELVETIANS ARE DEFEATED

iu cum esset pugnatum, *impedimentis* castrisque nostri potiti . Ibi *Orgetorigis filia* atque unus e filiis captus est. Ex roelio circiter hominum milia centum triginta superfuerunt ıe tota *nocte* continenter ierunt: *nullam partem* noctis *iti-* intermisso in fines Lingonum die quarto *pervenerunt*, cum ropter vulnera militum et propter sepulturam *occisorum* ri *triduum* morati eos *sequi* non potuissent. Caesar ad ;onas litteras nuntiosque misit ne eos *frumento* neve alia re rent.—1, 26

GALBA IN WINTER QUARTERS AT OCTODURUS

.cus Octodurus *positus* in valle non magna adiecta *planitie* simis montibus undique continetur. Cum hic in *duas* partes ıine *divideretur*, alteram partem eius *vici Gallis* ad *hieman-* concessit, alteram vacuam ab illis relictam cohortibus at- ıit. *Eum locum* vallo fossaque munivit.

ım dies hibernorum complures *transissent*, *frumentum*que ɔmportari iussisset, subito per exploratores *certior* factus ɜx ea parte vici, quam Gallis concesserat, *omnes* noctu ·ssisse, montesque qui *impenderent* a *maxima* multitudine :norum et Veragrorum *teneri*.— 3, 1, 2

THE BRITONS SUE FOR PEACE

ɔstes proelio superati, simul atque *se* ex fuga receperunt, n ad Caesarem legatos de pace miserunt, obsides daturos que imperasset facturos sese polliciti sunt. Una cum his .is Commius Atrebas venit, quem supra demonstraveram a ıre in Britanniam praemissum. Hunc illi e *navi* egressum, ad eos *oratoris modo* Caesaris mandata deferret, compre- erant atque in *vincula coniecerant:* tum *proelio* facto re- ·unt, et *in petenda pace* eius rei culpam in *multitudinem* :lerunt et propter imprudentiam ut *ignosceretur* petiverunt.

—4, 27

Rome.

b After this battle ambassadors came from Britain f
purpose of seeking peace.

c Having brought the grain that they promised, th
parted into their own territories.

8 Give the reason for the case of *impedimentis*, *tri*
frumento (*a*), *Gallis* (*b*, line 3), *proelio* (*c*, line 7); fc
mode of *sequi* (*a*), *divideretur*, *transissent*, *impenderen*
ignosceretur (*c*).

9 Decline, in the singular, *nullam partem*, *itinere* (*a*), *pl*
rum locum (*b*), *se*, *navi*, *vincula* (*c*). Decline *hiemandu*

10 Write in direct discourse *omnes . . . teneri* (*b*). C
in petenda pace (*c*) to the gerund construction.

11 Give the reason for the case of *Orgetorigis*, *nocte*
sorum (*a*), *vici* (*b*, line 3), *frumentum* (*b*), *modo* (*c*). Co
certior, *maxima* (*b*).

12 Write the principal parts of *pervenerunt* (*a*), *positus*
deretur, *teneri* (*b*), *coniecerant* (*c*).

13 Draw an outline map of Gaul, showing, with nam
location of each of *five* of the following: Jura mou
Rhodanus river, Gallia cisalpina (citerior provincia), the V
Octodurus, the Lingones, the Morini, the Nervii.

14 Give the derivation or composition of *each* of the foll
nullam, *frumento* (*a*), *flumine* (*b*), *oratoris*, *multitudin*
Give an English word containing the stem of *filia*, *itin*
duas, *teneri* (*b*), *navi* (*c*).

High School Department

169TH EXAMINATION

CAESAR'S COMMENTARIES

Tuesday, June 18, 1901—1.15 to 4.15 p. m., only

lnswer the first six questions and four of the others but **no more.** *If 'e than four of the others are answered only the first four answers l be considered. Each complete answer will receive 10 credits. Papers 'tled to 75 or more credits will be accepted.*

-5 Translate into English:

THE BELGAE ADVANCE ON THE CAMP OF CAESAR

taque paulisper apud oppidum morati *agros*que *Remorum* opulati omnibus *vicis* aedificiisque quos *adire* potuerant in- sis ad castra Caesaris *omnibus copiis* contenderunt et ab ibus passuum minus duobus castra posuerunt; *quae castra*, *fumo* atque *ignibus significabatur*, *amplius milibus* passuum) in latitudinem patebant.

aesar primo et propter multitudinem hostium et propter niam opinionem *virtutis proelio* supersedere statuit; quo- e tamen *equestribus* proeliis quid hostis *virtute posset* et l nostri *auderent* periclitabatur.—2, 7, 8

THE MORINI AND MENAPII FLEE TO THE FORESTS

[am quod intelligebant *maximas* nationes quae proelio *conten- ent* pulsas *superatasque esse*, continentesque silvas ac paludes ebant, eo se suaque omnia *contulerunt*. Ad quarum *initium* arum cum Caesar *pervenisset* castraque munire instituisset, ue hostis interim visus esset, dispersis in *opere* nostris subito omnibus partibus *silvae* evolaverunt et in nostros *impetum* :runt. Nostri *celeriter* arma ceperunt eosque in silvas re- :runt, et compluribus interfectis longius impeditioribus locis *ti* paucos ex suis deperdiderunt.—3, 28

THE BRITONS SEND AMBASSADORS TO CAESAR

iterim consilio eius cognito et per mercatores perlato ad annos, a compluribus insulae civitatibus ad eum legati veni- qui *polliceantur* obsides dare atque *imperio* populi Romani :mperare. Quibus auditis liberaliter pollicitus hortatusque 1 ea sententia *permanerent* eos *domum remittit*, et cum iis Commium, quem ipse Atrebatibus superatis regem ibi con- erat, cuius et virtutem et consilium probabat et quem *sibi* em esse arbitrabatur, cuiusque *auctoritas* in *his regionibus* ni habebatur, mittit.—4, 21

6 Translate into Latin [Do not use rare or poetic constructions]:

a After all their towns had been burned, the Remi led their forces to Caesar.

b We shall delay a few days in order to lay waste these fields.

c The bravery of the enemy is so great that we refrain from battle.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Caesar did not know what states would be faithful to the Roman people.

b You must make an attack on the villages and cities of the Britons.

c We followed them five miles from the beginning of the marshes.

8 Give the reason for the case of *Remorum*, *virtutis*, *virtute* (*a*), *imperio*, *domum* (*c*); for the mode of *adire*, *posset* (*a*), *pervenisset* (*b*), *polliceantur*, *permanerent* (*c*).

9 Write the principal parts of *auderent* (*a*), *contendissent*, *contulerunt* (*b*), *permanerent*, *remittit* (*c*).

10 Write in direct discourse *maximas . . . superatasque esse* (*b*).

11 Give the reason for the case of *vicis*, *fumo* (*a*), *milibus* (*a*, line 5), *proelio* (*a*), *silvae* (*b*), *sibi* (*c*). Compare *amplius* (*a*), *celeriter* (*b*).

12 Select from questions 1–5 a genitive denoting value (indefinite value), an ablative of accompaniment, a subjective genitive, an ablative of place where. Conjugate *secuti* (*b*) in the present indicative, in the imperfect subjunctive, in the perfect subjunctive.

13 Write a biographic sketch of Caesar, touching on *a*) his political career previous to the Gallic campaigns, *b*) his conquest of Gaul.

14 Decline, in the plural, *omnibus copiis*, *quae castra*, *milibus* (*a*), *opere*, *impetum* (*b*), *domum*, *his regionibus* (*c*).

15 Give the derivation or composition of *significabatur*, *equestribus* (*a*), *initium* (*b*), *permanerent*, *auctoritas* (*c*). Give an English word containing the stem of *agros*, *ignibus*, *milibus* (*a*), *imperio*, *domum* (*c*).

High School Department

167TH EXAMINATION

SALLUST'S CATILINE

Thursday, January 24, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CATILINE BINDS HIS CONFEDERATES BY AN OATH

Fuere ea *tempestate* qui *dicerent* Catilinam *oratione* habita, cum ad iusiurandum popularis *sceleris* sui adigeret, humani *corporis* sanguinem *vino* permixtum in pateris *circumtulisse;* inde cum post exsecrationem omnes *degustavissent*, sicut in sollemnibus sacris *fieri consuevit*, aperuisse consilium suum, atque *eo* fecisse, quo inter se magis *fidi forent*, alius *alii* tanti *facinoris* conscii. *Nonnulli* ficta et haec et *multa praeterea existimabant* ab iis, qui *Ciceronis* invidiam, quae postea *orta est*, leniri credebant atrocitate sceleris *eorum* qui *poenas* dederant.—22

b AN UPRISING OF THE POPULAR PARTY IMMINENT

Sed postquam Cn. Pompeius ad bellum *maritimum* atque Mithridaticum missus est, plebis opes imminutae, paucorum potentia crevit. Hi magistratus, provincias, aliaque omnia tenere; ipsi innoxii, florentes, sine metu aetatem *agere*, ceteros, qui plebem in magistratu placidius tractarent, iudiciis terrere. Sed ubi primum *dubiis* rebus novandi spes *oblata est*, *vetus certamen* animos eorum arrexit. Quodsi primo proelio Catilina *superior* aut aequa *manu discessisset*, profecto magna clades atque calamitas rem publicam *oppressisset*.—39

c DEATH OF CATILINE

Petreius ubi videt *Catilinam* contra ac ratus erat *magna vi* tendere, cohortem praetoriam in medios hostis inducit, eosque perturbatos atque alios alibi resistentes interficit; deinde utrimque ex lateribus ceteros aggreditur. Manlius et Faesulanus in primis pugnantes *cadunt*. Postquam fusas copias seque cum paucis relictum videt Catilina, *memor generis* atque *pristinae* suae dignitatis in confertissimos hostis incurrit, ibique pugnans confoditur.—60

6 Translate into Latin [Do not use rare or poetic constructions]:

a) Catiline binds his confederates by an oath in order that they may not reveal his plans, *b*) He thought that the plebeians would not be terrified by the decisions of the magistrates, *c*) Petreius attacked with so great force that Catiline's troops were scattered.

7 Translate into Latin [Do not use rare or poetic constructions]:

a) I fear that the unpopularity of Cicero may be increased by the punishment of these men, *b*) If Pompey should be sent to Asia, he would conquer the Mithridatic army, *c*) Is it true that the people have been treated too kindly?

8 Give the reason for the case of *tempestate*, *eo*, *alii* (*a*), *Catilinam*, *generis* (*c*); for the mode of *dicerent*, *fieri*, *forent* (*a*), *oppressisset* (*b*); for the tense of *existimabant* (*a*).

9 Write the principal parts of *consuevit*, *orta est* (*a*), *oblata est*, *discessisset* (*b*), *cadunt* (*c*).

10 Give the substance of the speeches of Caesar and Cato in regard to Catiline's conspiracy.

11 Distinguish in meaning between *sceleris* and *facinoris* (*a*), *vetus* (*b*) and *pristinae* (*c*). Compare *multa* (*a*), *superior* (*b*), *magna* (*c*).

12 Give the reason for the case of *oratione*, *vino*, *fidi*, *Ciceronis*, *eorum* (*a*), *vi* (*c*); for the mode of *circumtulisse*, *degustavissent* (*a*), *agere*, *oblata est* (*b*).

13 Translate into English:

Sed ea tempestate coepere se quisque magis extollere magisque ingenium in promptu habere. Nam regibus boni quam mali suspectiores sunt, semperque his aliena virtus formidulosa est. Sed civitas, incredibile memoratu est, adepta libertate quantum brevi creverit; tanta cupido gloriae incesserat.—7

14 Decline *nonnulli* (*a*) in the masculine and feminine singular, *vetus certamen* (*b*) in the singular, *generis* (*c*) in the plural. Give the second person plural of *each* of the tenses of the indicative and subjunctive of *fieri* (*a*).

15 Give the derivation or composition of *oratione*, *praeterea* (*a*), *maritimum*, *dubiis*, *certamen* (*b*). Give an English word containing the stem of *each* of the following: *corporis*, *poenas* (*a*), *vetus*, *manu* (*b*), *memor* (*c*).

High School Department

169TH EXAMINATION

SALLUST'S CATILINE

Thursday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a THE ADHERENTS OF CATILINE

Eo convenere multi ex *coloniis* et *municipiis*, domi nobiles. Erant praeterea complures paulo occultius consili huiusce *participes* nobiles, quos magis *dominationis* spes hortabatur quam inopia aut aliqua necessitudo. Ceterum *iuventus* pleraque, sed maxime *nobilium*, Catilinae *inceptis* favebat; *quibus* in otio vel magnifice vel *molliter vivere* copia erat, incerta pro certis, bellum quàm pacem *malebant*. Fuere item ea *tempestate* qui *crederent* M. Licinium Crassum non ignarum eius consili *fuisse*.—17

b CATILINE JOINS MANLIUS

Sed ipse paucos *dies* commoratus apud C. Flaminium in agro Arretino, dum vicinitatem antea sollicitatam armis exornat, cum *fascibus* atque aliis imperi insignibus in castra ad Manlium *contendit*. Haec ubi *Romae* comperta sunt, senatus Catilinam et Manlium *hostis* iudicat, ceterae multitudini diem *statuit*, ante quam sine fraude *liceret* ab armis *discedere* praeter *rerum* capitalium condemnatis. Praeterea *decernit*, uti consules delectum habeant, Antonius cum exercitu Catilinam *persequi* maturet, Cicero urbi *praesidio* sit.—36

c CAESAR'S SPEECH BEFORE THE SENATE

Postquam res publica adolevit, et multitudine civium factiones valuere, circumveniri *innocentes*, alia huiuscemodi fieri coepere, tum *lex Porcia* aliaeque leges paratae sunt, *quibus legibus* exsilium damnatis permissum est. Ego hanc causam, patres conscripti, quo minus novum *consilium capiamus*, in primis magnam *puto*. Profecto virtus atque sapientia maior in illis fuit, qui ex parvis *opibus* tantum imperium fecere, quam in nobis, qui ea *bene* parta vix *retinemus*.—51

6 Translate into Latin [Do not use rare or poetic constructions]:

a) There were those who favored Catiline and became participants of this war, *b*) It is uncertain whether the Roman senate prefers Caesar's plan or not, *c*) Do you not think that this state has been preserved by the wisdom of the consul?

7 Translate into Latin [Do not use rare or poetic constructions]:

a) When Catiline departed from Rome, he hastened first to Flaminius, *b*) A law was prepared to permit exile to many of the condemned, *c*) Though these men are innocent, nevertheless they will be condemned to death.

8 Give the reason for the case of *dominationis*, *tempestate* (*a*), *Romae*, *hostis* (*b*), *legibus* (*c*); for the mode of *crederent*, *fuisse* (*a*), *liceret*, *discedere* (*b*), *capiamus* (*c*).

9 Decline, in singular and plural, *iuventus* (*a*), *dies* (*b*), *quibus legibus*, *consilium* (*c*).

10 Write the principal parts of *malebant* (*a*), *contendit statuit*, *decernit* (*b*), *retinemus* (*c*).

11 Give the reason for the case of *nobilium*, *inceptis*, *quibus* (*a*), *dies*, *rerum*, *praesidio* (*b*). Compare *molliter* (*a*), *bene* (*c*).

12 Give an account of the conspiracy of Catiline, touching on *a*) causes, *b*) purpose, *c*) suppression.

13 Explain the reference in *coloniis*, *municipiis* (*a*), *fascibus* (*b*), *lex Porcia* (*c*). Distinguish in meaning between *crederent* (*a*) and *puto* (*c*).

14 Explain the composition of *participes* (*a*), *praesidio* (*b*), *innocentes* (*c*). Give an English word containing the stem of *each* of the following: *vivere*, *crederent* (*a*), *persequi* (*b*), *puto* (*c*).

15 Translate into English:

Si vincimus, omnia nobis tuta erunt, commeatus abunde, municipia atque coloniae patebunt; si metu cesserimus, eadem illa adversa fient; neque locus neque amicus quisquam teget quem arma non texerint. Praeterea, milites, non eadem nobis et illis necessitudo impendet: nos pro patria, pro libertate, pro vita certamus; illis supervacaneum est pro potentia paucorum pugnare.—58

High School Department

167TH EXAMINATION

CICERO'S ORATIONS

Friday, January 25, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CONSPIRACY OF CATILINE DISCREDITED BY MANY

Quamquam non *nulli* sunt in hoc ordine, qui aut ea quae imminent non *videant* aut ea quae vident dissimulent: qui spem Catilinae mollibus *sententiis aluerunt* coniurationemque nascentem non credendo corroboraverunt: *quorum* auctoritatem secuti multi non solum improbi, verum etiam imperiti, si in hunc animadvertissem, *crudeliter* et regie factum esse *dicerent.* Nunc *intellego,* si *iste,* quo intendit, in *Manliana castra pervenerit,* neminem tam *stultum* fore qui non videat *coniurationem* esse factam, neminem tam improbum qui non fateatur. —In Catilinam, 1, 12

b CICERO REFERS THE WHOLE MATTER TO THE SENATE

Sed ego institui *referre* ad vos, patres conscripti, tamquam *integrum,* et de facto quid *iudicetis* et de poena quid *censeatis.* Illa *praedicam,* quae sunt *consulis.* Ego magnum in re publica versari furorem et nova *quaedam misceri* et concitari mala iam pridem videbam, sed hanc tantam, tam exitiosam *haberi* coniurationem a civibus numquam putavi. Nunc quidquid est, quocumque vestrae mentes inclinant atque sententiae, *statuendum vobis ante noctem est.*—In Catilinam, 4, 3

c THE INFLUENCE AND CHARACTER OF CATULUS

Reliquum est ut de Q. Catuli auctoritate et sententia dicendum esse videatur. Qui cum ex vobis *quaereret,* si in uno Cn. Pompeio omnia poneretis, si quid eo factum esset, in quo spem *essetis habituri,* cepit magnum suae virtutis fructum ac dignitatis, cum *omnes* una prope *voce* in eo ipso vos spem habituros esse dixistis. Etenim talis est vir, ut nulla res *tanta sit* ac tam *difficilis,* quam ille non et consilio *regere* et integritate tueri et virtute conficere possit.—Pro lege Manilia, 20

6 Translate into Latin [Do not use rare or poetic constructions]:

a) There are some who say that they do not believe that a conspiracy has been made by Catiline, *b*) Had Catiline perceived the misfortunes that threatened him at Rome, he would have come to the camp of Manlius.

7 Translate into Latin [Do not use rare or poetic constructions]:

a) Would that Catiline had led out all his forces on the 27th of October, *b*) He asked me what the senate had decreed in regard to the punishment of the conspirators.

8 Give the reason for the case of *sententiis* (*a*), *coniurationem* (*a*, line 8), *vobis* (*b*), *voce*, *tanta* (*c*); for the mode of *videant* (*a*), *haberi* (*b*), *sit* (*c*); for the mode and tense of *dicerent* (*a*).

9 Write the principal parts of *aluerunt* (*a*), *misceri* (*b*). Write the second person plural of *each* of the tenses of the indicative, subjunctive and imperative active of *referre* (*b*).

10 Translate into English:

Carus fuit Africano superiori noster Ennius, itaque etiam in sepulcro Scipionum putatur is esse constitutus ex marmore. At iis laudibus certe non solum ipse qui laudatur, sed etiam populi Romani nomen ornatur. In caelum huius proavus Cato tollitur: magnus honos populi Romani rebus adiungitur.

Pro Archia poeta, 9

11 Give the reason for the case of *quorum*, *castra* (*a*), *integrum*, *consulis* (*b*), *omnes* (*c*); for the mode of *censeatis* (*b*), *quaereret*, *regere* (*c*); for the mode and tense of *pervenerit* (*a*).

12 State the occasion and the object of the first oration against Catiline. Give a brief outline of this oration.

13 Distinguish in meaning the following: *iudicetis*, *censeatis* and *statuendum est* (*b*). Give the force of *iste* (*a*). Explain the use of the periphrastic form *essetis habituri* (*c*). Explain the reference in *Manliana castra* (*a*), *ante noctem* (*b*).

14 Compare *crudeliter* (*a*), *difficilis* (*c*). Decline *nulli* (*a*) in the singular in all genders, *quaedam* (*b*) in the plural in all genders.

15 Explain by derivation the meaning of *each* of the following: *intellego*, *coniurationem* (*a*), *praedicam* (*b*). Give an English word containing the stem of *each* of the following: *nulli*, *stultum* (*a*), *noctem* (*b*), *voce* (*c*).

High School Department

168TH EXAMINATION

CICERO'S ORATIONS

Friday, March 29, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CHARACTER OF THE PARTISANS OF CATILINE

Sed cur tam diu de uno hoste *loquimur* et de eo hoste, qui iam fatetur se esse *hostem*, et quem, quia, quod semper volui, murus interest, non timeo: de his, qui dissimulant, qui *Romae* remanent, qui nobiscum sunt, nihil dicimus? Quos quidem ego, si ullo *modo* fieri *possit*, non tam ulcisci studeo quam sanare sibi ipsos, placare rei publicae, neque, id qua re fieri non possit, si me *audire* volent, intellego. Exponam enim vobis, *Quirites*, ex *quibus generibus* hominum istae copiae *comparentur*: deinde singulis medicinam consilii atque orationis meae, si quam potero, adferam.—In Catilinam, 2, 8

b THE GOVERNMENT IS PREPARED TO EXECUTE ANY DECREE

Sed ea, quae *exaudio*, *patres* conscripti, dissimulare non possum. Iaciuntur enim voces, quae perveniunt ad aures meas, eorum, qui vereri *videntur* ut *habeam* satis *praesidii ad ea*, quae *vos* statueritis hodierno *die*, *transigunda*. Omnia et provisa et parata et *constituta sunt*, patres conscripti, cum mea *summa* cura atque diligentia tum etiam multo maiore *populi Romani* ad summum imperium retinendum et *ad communes* fortunas *conservandas* voluntate.—In Catilinam, 4, 7

c EARLY CAREER OF ARCHIAS

Nam ut *primum* ex pueris *excessit* Archias atque ab iis artibus, quibus *aetas puerilis* ad *humanitatem* informari *solet*, se ad scribendi studium contulit, primum Antiochiae — nam ibi natus est loco nobili — celebri quondam *urbe* et *copiosa* atque eruditissimis hominibus liberalissimisque studiis adfluenti, *celeriter* antecellere *omnibus* ingenii *gloria* contigit. Post in ceteris Asiae partibus *cunctae*que Graeciae sic eius adventus celebrabantur, ut famam ingenii exspectatio hominis, exspectationem ipsius adventus admiratioque *superaret*.—Pro Archia poeta, 3

6 Translate into Latin [Do not use rare or poetic constructions]:

a Cicero says that he has prepared all things for the preservation of the state.

b If I had greater forces, I should not fear the approach of the enemy.

c Do not let him procure aid.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Do you know whether we can conciliate those who remain in the city?

b When Archias was young he applied himself to his studies with so great diligence that he became a learned poet.

8 Give the reason for the case of *hostem* (*a*), *praesidii*, *populi* (*b*), *urbe*, *gloria* (*c*); for the mode of *possit* (*a*, line 5), *comparentur* (*a*), *habeam* (*b*), *excessit*, *superaret* (*c*).

9 Decline throughout *quibus generibus* (*a*), *vos* (*b*), *aetas puerilis* (*c*).

10 Give the reason for the case of *Romae*, *modo* (*a*), *die* (*b*), *omnibus* (*c*). Compare *summa* (*b*), *primum*, *celeriter* (*c*).

11 Write the second person singular of *each* of the tenses of the indicative, active and passive, of *videntur* (*b*). Write the principal parts of *constituta sunt* (*b*), *solet* (*c*).

12 Distinguish in meaning between *Quirites* (*a*) and *Romani* (*b*), *audire* (*a*) and *exaudio* (*b*), *omnibus* and *cunctae* (*c*). Change *ad communes . . . conservandas* (*b*) to the gerund construction. Explain the reference in *ad ea . . . transigunda* (*b*).

13 State the occasion and the object of the oration for the Manilian law. Give a brief outline of this oration.

14 Give the derivation of *each* of the following words, with the meaning of primary word and of suffix: *puerilis*, *humanitatem*, *copiosa* (*c*). Give an English word containing the stem of *loquimur* (*a*), *patres*, *summa* (*b*), *celeriter* (*c*).

15 Translate into English:

Quod si Romae Cn. Pompeius privatus esset hoc tempore, tamen ad tantum bellum is erat deligendus atque mittendus: nunc cum ad ceteras summas utilitates haec quoque opportunitas adiungatur, ut in iis ipsis locis adsit, ut habeat exercitum, ut ab iis, qui habent, accipere statim possit, quid exspectamus?

Pro lege Manilia, 17

High School Department

169TH EXAMINATION

CICERO'S ORATIONS

Friday, June 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but* no more. *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1–5 Translate into English:

a CATILINE HAS DIFFICULTY IN SECURING A SPONSOR

Haec si tecum, ut dixi, patria *loquatur*, nonne impetrare *debeat*, etiam si vim adhibere non possit? Quid, quod tu te ipse in *custodiam* dedisti? quod vitandae *suspicionis causa* ad M'. Lepidum te habitare velle dixisti? a quo non receptus etiam ad me venire ausus es, atque ut *domui* meae te *adservarem* rogasti. Cum a me *quoque* id responsum tulisses, *me nullo modo* posse iisdem *parietibus* tuto esse tecum, qui magno in periculo essem, quod iisdem *moenibus contineremur*, ad Q. Metellum *praetorem* venisti: a quo repudiatus ad sodalem tuum, *virum optimum*, M. Marcellum demigrasti.

—In Catilinam, 1, 8

b PREPARATIONS FOR ARRESTING THE CONSPIRATORS

Itaque hesterno *die* L. Flaccum et C. Pomptinum praetores, fortissimos atque amantissimos *rei publicae* viros, ad me vocavi, rem *exposui*, quid fieri *placeret* ostendi. Illi *autem*, qui omnia de re publica praeclara atque *egregia sentirent*, sine recusatione ac sine *ulla mora negotium susceperunt* et, cum *advesperasceret*, occulte ad pontem Mulvium pervenerunt atque ibi in *proximis* villis ita bipartito fuerunt, ut Tiberis inter eos et pons *interesset*.

—In Catilinam, 3, 2

c MANILIUS ADVISED TO STAND FIRM

Quae cum ita *sint*, C. Manili, primum istam tuam et *legem* et voluntatem et sententiam laudo *vehementissime*que comprobo: deinde te hortor, ut auctore *populo* Romano maneas in sententia neve *cuiusquam* vim aut minas pertimescas. Primum in te satis esse *animi* perseverantiaeque arbitror: deinde cum tantam multitudinem cum tanto studio adesse *videamus*, quantam *iterum* nunc in *eodem homine* praeficiendo videmus, quid est quod aut de re aut de perficiendi facultate dubitemus?—Pro lege Manilia, 24

6 Translate into Latin [Do not use rare or poetic constructions]:

a) After Catiline had been refused by Lepidus, he asked Cicero to receive him, *b*) I do not doubt that the pretor will write a reply to you, *c*) Do not fear that the country will not be safe.

7 Translate into Latin [Do not use rare or poetic constructions]:

a) He asked me to come to his house on the twenty-seventh of December at three o'clock in the afternoon, *b*) The consul must summon brave men for the purpose of carrying out this matter.

8 Give the reason for the case of *suspicionis*, *moenibus* (*a*), *die* (*b*), *populo*, *animi* (*c*); for the mode of *debeat*, *adservarem* (*a*), *placeret*, *advesperasceret* (*b*), *sint* (*c*).

9 Decline *domui*, *me* (*a*), throughout; *ulla mora* (*b*), *eodem homine* (*c*), in the singular; *cuiusquam* (*c*) in the masculine and neuter singular.

10 Write the second person singular of *each* of the tenses of the indicative, subjunctive and imperative of *loquatur* (*a*). Write the principal parts of *exposui* (*b*), *videamus* (*c*).

11 Give the reason for the case of *causa*, *modo*, *praetorem* (*a*). *rei publicae* (*b*); for the mode of *sentirent*, *interesset* (*b*). Compare *proximis* (*b*), *vehementissime* (*c*).

12 Distinguish in meaning *parietibus* and *moenibus* (*a*). Account for the position of *quoque* (*a*), *autem* (*b*). Explain the reference in *custodiam* (*a*). Mention and define the figure in *virum optimum* (*a*).

13 Write in direct discourse *me nullo modo . . . continueremur* (*a*).

14 Give the composition of *each* of the following and show how the meaning of each is derived: *egregia*, *negotium*, *susceperunt* (*b*). Give an English word containing the stem of *loquatur*, *debeat* (*a*), *legem*, *iterum* (*c*).

15 Translate into English:

Quotiens ego hunc Archiam vidi, iudices—utar enim vestra benignitate, quoniam me in hoc novo genere dicendi tam diligenter attenditis—quotiens ego hunc vidi, cum litteram scripsisset nullam, magnum numerum optimorum versuum de iis ipsis rebus, quae tum agerentur, dicere ex tempore! quotiens revocatum eandem rem dicere commutatis verbis atque sententiis!

—Pro Archia poeta, 8

High School Department

167TH EXAMINATION

VIRGIL'S AENEID

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a AENEAS SETS OUT TO EXPLORE THE COAST

At pius Aeneas, per noctem *plurima* volvens,
Ut primum lux *alma* data est, exire locosque
Explorare novos, *quas* vento *accesserit* oras,
Qui *teneant*, nam *inculta* videt, hominesne feraene,
Quaerere constituit, sociisque exacta referre.
Classem in convexo nemorum sub rupe cavata
Arboribus clausam circum atque *horrentibus umbris*
Occulit; ipse uno graditur comitatus Achate,
Bina manu lato crispans hastilia *ferro*.—1, 305–313

b THE PROPHECY OF CELAENO TERRIFIES THE TROJANS

At *sociis subita gelidus formidine* sanguis
Deriguit; *cecidere animi*, nec iam *amplius armis*,
Sed votis precibusque iubent *exposcere pacem*,
Sive deae, seu *sint* dirae obscenaeque *volucres*.
Et pater *Anchises passis* de litore palmis
Numina magna vocat, *meritos*que indicit *honores*:
Di, *prohibete* minas; di, *talem* avertite *casum*,
Et placidi servate pios! Tum *litore* funem
Deripere, excussosque iubet laxare rudentis.—3, 259–267

c AENEAS VISITS THE ELYSIAN FIELDS

His demum exactis, perfecto *munere divae*,
Devenere *locos* laetos et amoena virecta
Fortunatorum nemorum sedesque beatas.
Largior hic campos aether et *lumine* vestit
Purpureo, solemque suum, sua sidera norunt.
Pars in gramineis *exercent membra* palaestris,
Contendunt ludo et fulva luctantur arena;
Pars *pedibus* plaudunt choreas et carmina dicunt.—6, 637–644

6 Translate into Latin [Do not use rare or poetic constructions]:

a) If he should conceal the fleet, it would not be captured, *b*) There is no doubt that wild animals occupy these groves, *c*) May the gods preserve pious Aeneas and his faithful companions.

7 Translate into Latin [Do not use rare or poetic constructions]:

a) We shall seek to avert so great dangers from ourselves, *b*) They decided to come down into the grassy plain, *c*) Anchises is about to invoke the aid of the gods in order that he may be preserved from misfortune.

8 Give the reason for the case of *ferro* (*a*), *sociis* (*b*), *litore* (*b*, line 8), *divae* (*c*); for the mode of *teneant* (*a*), *sint* (*b*). Select from questions 1–5 *two* different examples of poetic construction and give the corresponding prose construction in each case.

9 Give the principal parts of *quaerere*, *constituit* (*a*), *cecidere*, *passis* (*b*), *exercent* (*c*).

10 Mention and explain the figure in *armis . . . exposcere pacem* (*b*). Explain the reference in *each* of the following: *meritos . . . honores*, *talem . . . casum* (*b*), *munere divae*, *largior* (*c*).

11 Translate into English:

Quis tibi tum, Dido, cernenti talia sensus,
Quosve dabas gemitus, cum litora fervere late
Prospiceres arce ex summa, totumque videres
Misceri ante oculos tantis clamoribus aequor?
Inprobe amor, quid non mortalia pectora cogis?—4, 408-412

12 Decline in the singular *classem*, *horrentibus umbris* (*a*), *Anchises* (*b*), *litore* (*b*, line 8), *membra* (*c*). Compare *plurima* (*a*), *amplius* (*b*).

13 Write the first *two* lines of (*b*), indicating quantity of syllables, division into feet and principal cesuras. Account for the quantity of the penult of *sociis*, *cecidere*; for the ultima of *subita*, *gelidus*, *animi*, *armis*.

14 Draw an outline map of the Mediterranean sea. Trace on this map the course of Aeneas from Troy to Carthage, writing the names of the principal places visited.

15 Explain the derivation or composition of *alma*, *accesserit*, *inculta* (*a*), *subita*, *volucres*, *prohibete* (*b*). Mention an English word containing the stem of *each* of the following: *formidine* (*b*), *locos*, *lumine*, *pedibus* (*c*).

High School Department

168TH EXAMINATION

VIRGIL'S AENEID

Friday, March 29, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a MEETING OF AENEAS AND VENUS

Sic Venus; et Veneris contra sic filius orsus:
Nulla tuarum audita *mihi* neque visa *sororum*,
O — quam te *memorem*, virgo? namque haud *tibi vultus*
Mortalis, nec *vox hominem* sonat: o, *dea* certe;
An Phoebi soror? an nympharum sanguinis una?
Sis felix, nostrumque leves, quaecumque, laborem,
Et, quo sub caelo tandem, quibus orbis in oris
Iactemur, *doceas:* ignari *hominum*que locorumque
Erramus, vento huc vastis et *fluctibus* acti.—1, 325–333

b DEATH OF DIDO

Tum Iuno omnipotens, longum miserata dolorem
*Difficilis*que obitus, Irim *demisit Olympo*,
Quae luctantem *animam* nexosque *resolveret* artus.
Nam quia *nec fato*, merita nec morte *peribat*,
Sed *misera* ante diem, subitoque accensa *furore*,
Nondum *illi* flavum *Proserpina vertice* crinem
Abstulerat, Stygioque *caput* damnaverat Orco.—4, 693–699

c SEARCH FOR THE GOLDEN BRANCH

Vix ea fatus erat, geminae cum forte columbae
Ipsa sub *ora viri* caelo venere volantes,
Et viridi sedere solo. Tum maximus heros
Maternas adgnoscit *aves*, laetusque precatur:
Este *duces*, o, si qua via est, cursumque per auras
Dirigite in lucos, ubi pinguem *dives* opacat
Ramus humum. Tuque, o, dubiis ne deficе rebus,
Diva parens. Sic effatus vestigia *pressit*,
Observans, quae *signa* ferant, quo *tendere* pergant.—6, 190–198

6 Translate into Latin [Do not use rare or poetic constructions]:

a Do not come to these shores lest, ignorant of the way, you perish.

b Let us observe the course of the birds through the heavens.

c Aeneas said that he did not recognize the voice of Venus.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Since Proserpine did not relieve Dido's suffering, Iris was sent down from heaven by Juno.

b If the goddess would be our guide, it would not be difficult to advance.

8 Give the reason for the case of *sorōrum*, *tibi*, *hominem* (*a*), *vertice* (*b*), *viri* (*c*); for the mode of *memorem*, *sis*, *iactemur* (*a*), *resolveret* (*b*), *tendere* (*c*).

9 Decline throughout *vultus*, *dea* (*a*), *ora*, *aves*, *signa* (*c*).

10 Select from questions 1–5 an example of poetic construction and give the corresponding prose construction. Explain the reference in *Olympo*, *nec fato . . . peribat*, *Proserpina vertice . . . abstulerat* (*b*), *diva parens* (*c*).

11 Give the reason for the case of *mihi*, *hominum* (*a*), *furore*, *illi* (*b*), *duces* (*c*). Compare *felix* (*a*), *dives* (*c*). Derive an adverb from *misera* (*b*).

12 Write the principal parts of *doceas* (*a*), *demisit*, *abstulerat* (*b*), *pressit*, *tendere* (*c*).

13 Write the first *three* lines of (*b*), indicating quantity of syllables, division into feet and principal cesuras. Define and illustrate ecthlipsis, elision.

14 Give the derivation or composition of *each* of the following: *mortalis*, *iactemur*, *fluctibus* (*a*), *difficilis* (*b*), *duces* (*c*). Give an English word containing the stem of *vox*, *felix* (*a*), *animam*, *caput* (*b*), *maternas* (*c*).

15 Translate into English:

Tum procul e fluctu Trinacria cernitur Aetna,
Et gemitum ingentem pelagi pulsataque saxa
Audimus longe fractasque ad litora voces,
Exsultantque vada, atque aestu miscentur arenae.
Et pater Anchises: Nimirum haec illa Charybdis.—3, 554-558

High School Department

169TH EXAMINATION

VIRGIL'S AENEID

Tuesday, June 18, 1901 — 1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a ILIONEUS ADDRESSES DIDO

O *regina*, *novam* cui *condere Iuppiter urbem*
Iustitiaque dedit gentis frenare *superbas*,
Troes te *miseri*, ventis maria *omnia* vecti,
Oramus, prohibe *infandos* a navibus ignis,
Parce *pio generi*, et *propius* res aspice nostras.
Non nos aut *ferro* Libycos populare *penatis*
Venimus, aut raptas ad litora *vertere* praedas;
Non ea vis animo, nec tanta superbia *victis*.— 1, 522–529

b AENEAS PREPARES FOR FLIGHT

Mnesthea Sergestumque vocat fortemque Serestum,
Classem aptent taciti sociosque ad *litora cogant*,
Arma parent, et, quae rebus *sit* causa novandis,
Dissimulent; sese interea, quando *optima* Dido
Nesciat et tantos *rumpi* non speret amores,
Temptaturum aditus, et quae mollissima *fandi*
Tempora, quis *rebus* dexter modus. Ocius omnes
Inperio laeti parent ac iussa facessunt.— 4, 288–295

c APPEAL OF AENEAS TO THE SIBYL

Unum oro: quando hic *inferni* ianua *regis*
Dicitur et tenebrosa palus Acheronte refuso,
Ire ad conspectum cari genitoris et ora
Contingat; *doceas* iter et sacra ostia *pandas*.
Illum ego per flammas et mille *sequentia tela*
Eripui his humeris, medioque ex hoste recepi;
Ille meum comitatus iter maria omnia mecum
Atque omnis pelagique *minas caeli*que ferebat,
Invalidus, viris ultra sortemque senectae.— 6, 106–114

6 Translate into Latin [Do not use rare or poetic constructions]:

a) The Trojans did not come with their ships to seize booty on these shores, *b*) He says that he rescued his father from the flames and from the weapons of the enemy.

7 Translate into Latin [Do not use rare or poetic constructions]:

a) Unless the fates prevent, this city will be laid waste with fire and sword, *b*) The companions of Aeneas did not know what plans their king would make concerning the fleet, *c*) The ships must be prepared.

8 Give the reason for the case of *generi*, *ferro*, *victis* (*a*), *rebus* (*b*, line 7), *regis* (*c*); for the mode of *cogant*, *sit*, *nesciat*, *rumpi* (*b*), *doceas* (*c*).

9 Explain the reference in *penatis* (*a*), *inferni regis*, *illum ego . . . eripui* (*c*).

10 Write the principal parts of *condere*, *vertere* (*a*), *cogant*, *rumpi* (*b*), *doceas* (*c*).

11 Translate into English:

Ecce autem elapsus Pyrrhi de caede Polites,
Unus natorum Priami, per tela, per hostis
Porticibus longis fugit, et vacua atria lustrat
Saucius: illum ardens infesto vulnere Pyrrhus
Insequitur, iam iamque manu tenet et premit hasta.

—2, 526–530

12 Write the first *three* lines of (*a*), indicating quantity of syllables, division into feet and principal cesuras. Account for the quantity of the ultima in *regina*, *miseri;* of the penult in *superbas*, *omnia*.

13 Select from (*a*) an example of poetic construction and give the corresponding prose construction. Mention and define the figure in *ferro* (*a*), *doceas . . . pandas*, *minas caeli* (*c*). Explain the meaning of *pio* (*a*).

14 Decline *Iuppiter* (*a*), *fandi* (*b*); *litora*, *inperio* (*b*), *sequentia tela* (*c*), in the singular. Compare *propius* (*a*), *optima* (*b*).

15 Give the composition of *condere*, *infandos* (*a*), *cogant*, *nesciat* (*b*), *eripui* (*c*). Give an English word containing the stem of *each* of the following: *novam*, *urbem* (*a*), *dexter* (*b*), *doceas*, *ego* (*c*).

High School Department

167TH EXAMINATION

VIRGIL'S ECLOGUES

Monday, January 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a CORYDON INVITES ALEXIS TO A COUNTRY LIFE

Nec sum adeo *informis:* nuper me in litore vidi,
Cum placidum ventis *staret* mare; non ego Daphnim
Iudice *te* metuam, si numquam *fallit imago.*
O tantum *libeat* mecum *tibi* sordida *rura*
Atque *humilis* habitare casas, et figere cervos,
Haedorumque *gregem* viridi compellere hibisco!
Mecum una in silvis imitabere Pana *canendo.*
Pan primus calamos cera coniungere *pluris*
Instituit; Pan curat ovis oviumque magistros.—2, 25–33

b SILENUS BEGINS THE PROMISED SONG

Ille dolum *ridens*, Quo vincula nectitis? inquit.
Solvite me, pueri; satis est potuisse videri.
Carmina, quae vultis, *cognoscite;* carmina vobis,
Huic aliud mercedis erit. Simul incipit ipse.
Tum vero in numerum *Faunos*que ferasque *videres*
Ludere, tum rigidas motare cacumina quercus;
Nec tantum *Phoebo gaudet* Parnasia rupes,
Nec tantum Rhodope miratur et Ismarus Orphea.—6, 23–30

c THE LOVE CHARM

A. *Effer aquam*, et molli cinge haec *altaria* vitta,
Verbenasque adole pinguis et mascula tura:
Coniugis ut magicis sanos *avertere* sacris
Experiar sensus; nihil hic nisi carmina desunt.
Ducite ab urbe *domum*, mea carmina, ducite Daphnim.
Carmina vel *caelo* possunt *deducere* Lunam;
Carminibus Circe socios mutavit *Ulixi;*
Frigidus in pratis cantando rumpitur anguis.—8, 64–71

6 Translate into Latin [Do not use rare or poetic constructions]:

a If the sea were only calm, you could see your beautiful image in the water.

b I was fearing that Daphnis might not drive the sheep to the meadows.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Would that my songs might draw Daphnis away from his evil companions and lead him home.

b Since you free me from chains, I shall try to imitate Pan with my reed.

8 Give the reason for the case of *te*, *cera* (*a*), *Phoebo* (*b*), *domum*, *caelo* (*c*); for the mode of *staret*, *libeat* (*a*), *videres* (*b*), *experiar*, *deducere* (*c*).

9 Write the principal parts of *staret*, *fallit* (*a*), *gaudet* (*b*), *effer*, *avertere* (*c*).

10 Explain the reference in *Pan primus calamos . . . instituit* (*a*), *Faunos* (*b*), *carminibus Circe . . . Ulixi* (*c*).

11 Decline *tibi*, *rura*, *canendo* (*a*), *ridens* (*b*) in the masculine and neuter singular, *Ulixi* (*c*). Compare *pluris* (*a*).

12 Write an account of the *Eclogues*, touching on *a*) influence of Greek models, *b*) literary merits, *c*) topics treated.

13 Write the first *three* lines of *c*, marking quantity of syllables, division into feet and principal cesuras. Define dieresis, elision.

14 Give the derivation or composition of *informis*, *humilis* (*a*), *cognoscite* (*b*), *altaria*, *sensus* (*c*). Give an English word containing the stem of *each* of the following: *imago*, *gregem*, *cera* (*a*), *aquam*, *domum* (*c*).

15 Translate into English:

At tibi prima, puer, nullo munuscula cultu
Errantis hederas passim cum bacchare tellus
Mixtaque ridenti colocasia fundet acantho.
Ipsae lacte domum referent distenta capellae
Ubera, nec magnos metuent armenta leones.—4, 18–22

High School Department

169TH EXAMINATION

VIRGIL'S ECLOGUES

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first six questions and four of the others but **no more**. *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a RAILLERY OF DAMOETAS AND MENALCAS

D. Et *nobis* idem Alcimedon duo pocula fecit,
Et *molli* circum est ansas amplexus acantho,
Orpheaque in *medio* posuit *silvasque sequentis.*
Necdum *illis* labra admovi, sed *condita* servo.
Si ad vitulam *spectas*, nihil est, quod pocula *laudes.*
M. Nunquam hodie effugies; veniam, quocumque vocaris.
Audiat haec tantum—vel qui venit, ecce, Palaemon.
Efficiam posthac ne quemquam *voce* lacessas.—3, 44–51

b MELIBOEUS INVITED TO WITNESS A TRIAL OF SKILL

Ille ubi me contra videt: *Ocius*, inquit,
Huc ades, o Meliboee! caper *tibi* salvus et haedi;
Et, si *quid cessare* potes, requiesce sub umbra.
Huc ipsi *potum* venient per prata iuvenci;
Hic viridis tenera praetexit arundine ripas
Mincius, eque *sacra* resonant examina *quercu.*
Quid *facerem?* neque ego Alcippen, neque *Phyllida* habebam,
Depulsos a lacte *domi* quae *clauderet* agnos;
Et *certamen* erat, *Corydon* cum Thyrside, *magnum.*—7, 8–16

c THE LOVE OF GALLUS

Incipe; sollicitos *Galli dicamus* amores,
Dum tenera attondent simae virgulta *capellae.*
Non *canimus* surdis; respondent *omnia silvae.*
Quae nemora, aut qui vos *saltus* habuere, *puellae*
Naides, indigno cum Gallus *amore* peribat?
Nam neque Parnasi *vobis iuga*, nam neque Pindi
Ulla moram fecere, neque Aonie Aganippe.
Illum etiam lauri, *etiam flevere* myricae.—10, 6–13

6 Translate into Latin [Do not use rare or poetic constructions]:

a We must drive the goats and kids from the forest to the meadow without delay.

b Tell Palaemon to come hither and listen to this contest between Corydon and Thyrsis.

7 Translate into Latin [Do not use rare or poetic constructions]:

a He says that Meliboeus is resting under an oak-tree, while the lambs crop the tender shrubs.

b I have two golden cups that were made for me by Alcimedon.

8 Give the reason for the case of *illis*, *voce* (*a*), *tibi*, *domi* (*b*), *Galli* (*c*); for the mode of *spectas*, *laudes* (*a*), *cessare*, *facerem* (*b*), *dicamus* (*c*).

9 Explain the reference in *Orpheaque silvasque sequentis* (*a*), *sacra quercu* (*b*), *puellae Naides* (*c*).

10 Give the reason for the case of *condita* (*a*), *quid* (*b*, line 3), *Corydon* (*b*), *amore* (*c*). Give the syntax and use of *potum* (*b*). Write the principal parts of *clauderet* (*b*), *canimus* (*c*).

11 Distinguish in meaning *silvae*, *nemora*, *saltus* (*c*). Select from questions 1–5 an indeclinable noun, a predicate nominative, an example of personification. Compare *molli* (*a*), *ocius* (*b*).

12 Write the last *three* lines of (*c*), marking quantity of syllables, division into feet and principal cesuras. Account for the quantity of the penult of *etiam*, *flevere*; for the ultima of *vobis*, *iuga*.

13 Decline *nobis*, *Orphea* (*a*), *Phyllida* (*b*), *quae nemora* (*c*), *illum* (*c*) in the masculine.

14 Give the derivation or composition of *each* of the following, stating in each case the meaning of primary word and of prefix or suffix: *depulsos*, *certamen* (*b*), *capellae* (*c*). Give an English word containing the stem of *medio*, *laudes* (*a*), *magnum* (*b*), *omnia* (*c*).

15 Translate into English:

T. Urbem, quam dicunt Romam, Meliboee, putavi
Stultus ego huic nostrae similem, quo saepe solemus
Pastores ovium teneros depellere fetus.
Sic canibus catulos similis, sic matribus haedos
Noram, sic parvis conponere magna solebam.— 1, 20–24

High School Department

167TH EXAMINATION

LATIN—Second Year

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a THE ATHENIANS DEMAND THE DEATH OF ALCIBIADES

Hoc cum moliretur *peteret*que a Pharnabazo, ut ad regem mitteretur, eodem *tempore* Critias ceterique tyranni Atheniensium certos *homines* ad Lysandrum in Asiam miserant, qui eum certiorem *facerent*, nisi Alcibiadem *sustulisset*, *nihil* earum rerum fore ratum, quas ipse *Athenis constituisset:* quare, si *suas res* gestas *manere* vellet, illum persequeretur. His Laco rebus commotus statuit accuratius *sibi agendum* cum Pharnabazo.—Alcibiades, 10

b EPAMINONDAS RETAINS HIS COMMAND BEYOND THE LEGAL TIME

Lex erat Thebis, quae morte multabat, si quis imperium *diutius retinuisset*, quam lege praefinitum foret. Hanc Epaminondas cum *rei publicae* conservandae causa latam *videret*, ad perniciem *civitatis conferre* noluit et quattuor *mensibus* diutius, quam populus *iusserat*, gessit imperium.

Postquam domum reditum est, *collegae* eius *hoc crimine* accusabantur. Quibus ille permisit, ut omnem causam in se transferrent suaque opera factum contenderent, ut *legi* non obedirent.—Epaminondas, 7, 8

c HANNIBAL GOES TO CRETE

Antiocho fugato, verens, ne *dederetur*, quod sine dubio *accidisset*, si sui fecisset potestatem, *Cretam* ad Gortynios venit, ut ibi, quo se *conferret*, consideraret. Vidit autem *vir omnium* callidissimus magno se *fore* periculo, nisi quid providisset, propter *avaritiam* Cretensium. *Magnam* enim secum *pecuniam portabat*, de qua *sciebat* exisse famam. Itaque capit tale consilium. Amphoras complures complet *plumbo*, summas operit auro et argento.—Hannibal, 5

6 Translate into Latin [Do not use rare or poetic constructions]:

a Certain men who were very shrewd were sent from Athens to treat with Lysander.

b When Hannibal came to Crete, he did not know what plans he should form in regard to his money.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Alcibiades was unwilling to return to Athens, because he feared that he would be accused by the tyrants.

b Epaminondas was informed that he had retained command longer than the law permitted.

8 Give the reason for the case of *tempore*, *Athenis* (*a*), *mensibus* (*b*), *Cretam*, *omnium* (*c*); for the mode of *peteret*, *constituisset* (*a*), *dederetur*, *accidisset* (*c*); for the tense of *portabat* (*c*).

9 Decline *Athenis* (*a*). Decline, in the singular, *hoc crimine* (*b*), *vir* (*c*). Compare *diutius* (*b*), *magnam* (*c*). Distinguish in meaning between *homines* (*a*) and *vir* (*c*).

10 Write the principal parts of *sustulisset*, *manere*, *agendum* (*a*), *iusserat* (*b*), *sciebat* (*c*).

11 Give the reason for the case of *sibi* (*a*), *rei publicae*, *civitatis*, *legi* (*b*), *plumbo* (*c*); for the mode of *facerent* (*a*), *videret* (*b*), *conferret*, *fore* (*c*). Give the syntax of *suas res . . . manere* (*a*).

12 Write the third person singular of *each* of the tenses of the indicative and subjunctive, active and passive, of *conferre* (*b*).

13 Write biographic sketches of *two* of the following: Alcibiades, Epaminondas, Hannibal, Lysander.

14 Give, with meaning of each part, the composition of *retinuisset*, *collegae* (*b*), *accidisset* (*c*). Mention an English word containing the stem of *nihil* (*a*), *legi* (*b*), *avaritiam*, *pecuniam* (*c*).

15 Translate into English:

Sine dubio post Leuctricam pugnam Lacedaemonii se numquam refecerunt neque pristinum imperium recuperarunt, cum interim numquam Agesilaus destitit, quibuscumque rebus posset, patriam iuvare. Nam cum praecipue Lacedaemonii indigerent pecunia, ille omnibus, qui a rege defecerant, praesidio fuit.—Agesilaus, 7

High School Department

169TH EXAMINATION

LATIN—Second Year

Tuesday, June 18, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a SUCCESSION OF SPARTAN KINGS

Mos est enim a *maioribus* Lacedaemoniis traditus, ut duos haberent semper reges, nomine magis quam imperio, ex duabus *familiis* Procli et Eurysthenis, qui *principes* ex progenie Herculis *Spartae* reges fuerunt. *Horum* ex *altera* in alterius familiae locum fieri non licebat. Ita utraque suum retinebat ordinem. *Primum* ratio habebatur, qui maximus *natu esset* ex liberis eius, qui regnans decessisset; sin is virilem sexum non *reliquisset*, tum deligebatur, qui *proximus* esset propinquitate.—Agesilaus, 1

b CHARACTER OF CIMON

Hunc Athenienses non solum in bello, sed etiam in pace diu desideraverunt. Fuit enim tanta *liberalitate*, cum compluribus *locis* praedia hortosque haberet, ut numquam in eis custodem *imposuerit fructus servandi gratia*, ne quis *impediretur*, quo minus eius *rebus*, quibus quisque vellet, frueretur. Semper eum *pedisequi* cum nummis sunt secuti, ut, si quis *opis* eius indigeret, haberet, quod statim daret, ne *differendo* videretur negare. Saepe, cum aliquem *videret* minus bene vestitum, suum amiculum dedit.—Cimon, 4

c THE CENSORSHIP OF CATO

Qua ex re Scipio iratus *senatui*, consulatu peracto privatus in urbe mansit. At Cato, censor cum eodem Flacco factus, severe praefuit ei *potestati*. Nam et in complures nobiles animadvertit et multas res novas in edictum addidit, *qua re* luxuria reprimeretur, quae iam tum *incipiebat* pullulare. Circiter *annos* octoginta, usque ad *extremam* aetatem ab adulescentia, rei publicae *causa* suscipere *inimicitias* non destitit. A multis temptatus non modo nullum detrimentum existimationis fecit, sed, quoad *vixit*, virtutum laude *crevit*.—Cato, 2

6 Translate into Latin [Do not use rare or poetic constructions]:

a Though he has much fruit in his garden yet he does not give me any.

b He denies that he is about to depart from Sparta because he has not been chosen king.

7 Translate into Latin [Do not use rare or poetic constructions]:

a Let us restrain those who wish to retain their wealth by oppressing the people.

b According to custom the kings must be chosen from the descendants of Hercules.

8 Give the reason for the case of *natu*, *proximus* (*a*), *liberalitate*, *opis* (*b*), *senatui* (*c*); for the mode of *esset* (*a*, line 7), *reliquisset* (*a*), *imposuerit*, *impediretur*, *videret* (*b*).

9 Write the principal parts of *reliquisset* (*a*), *imposuerit* (*b*), *incipiebat*, *vixit*, *crevit* (*c*).

10 Decline *altera* (*a*) in the masculine singular; *mos* (*a*), *fructus*, *differendo* (*b*), *qua re* (*c*), throughout.

11 Give the reason for the case of *Spartae*, *horum* (*a*), *locis*, *rebus* (*b*), *potestati*, *causa* (*c*). Compare *primum* (*a*), *extremam* (*c*).

12 From the above passages select *two* substantive clauses and give the syntax of *one* of the clauses selected. Change *fructus servandi gratia* (*b*) to a dependent clause of equivalent meaning. Write the second person plural of *each* of the tenses of the indicative and subjunctive active of *videret* (*b*).

13 Write biographic sketches of *two* of the following: Themistocles, Aristides, Miltiades, Nepos.

14 Explain the composition of *each* of the following and show how the meaning of each is derived: *principes* (*a*), *pedisequi* (*b*), *inimicitias* (*c*). Give an English word containing the stem of *maioribus*, *familiis* (*a*), *fructus* (*b*), *annos* (*c*).

15 Translate into English:

At Alcibiades, victis Atheniensibus non satis tuta eadem loca sibi arbitrans, penitus in Thraciam se supra Propontidem abdidit, sperans ibi facillime suam fortunam occuli posse. Falso. Nam Thraces, postquam eum cum magna pecunia venisse senserunt, insidias fecerunt; qui ea, quae apportarat, abstulerunt, ipsum capere non potuerunt.—Alcibiades, 9

High School Department

167TH EXAMINATION

LATIN—Third Year

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If more than four of the others are answered only the first four answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–5 Translate into English:

a THE MANDUBII ARE COMPELLED TO LEAVE THEIR OWN TOWN

Mandubii, qui eos oppido receperant, cum liberis atque uxoribus exire *coguntur.* Hi cum ad munitiones *Romanorum accessissent*, flentes omnibus *precibus* orabant ut se in servitutem receptos cibo *iuvarent.* At Caesar dispositis in vallo *custodiis* recipi prohibebat.

Interea Commius et reliqui duces, quibus summa *imperii* permissa erat, cum omnibus copiis ad Alesiam perveniunt, et colle exteriore occupato non longius mille *passibus* ab nostris munitionibus considunt. Postero die equitatu ex castris educto omnem eam planitiem, quam in longitudinem tria *milia* passuum patere demonstravimus, complent.

cibus=food —Caesar, De bello Gallico, 7, 78, 79

b EXTRACT FROM ONE OF CICERO'S LETTERS TO HIS FAMILY

Noli *putare me* ad quemquam longiores epistulas scribere, nisi si quis ad me plura scripsit, cui puto rescribi oportere. Nec enim habeo quod *scribam* nec hoc tempore quidquam difficilius facio. Ad te vero et ad nostram Tulliolam non queo sine plurimis lacrimis scribere. Vos enim video esse *miserrimas*, quas ego beatissimas semper esse volui idque praestare debui et, nisi tam timidi fuissemus, *praestitissem.* Pisonem nostrum *merito* eius amo plurimum. Eum, ut potui, per litteras cohortatus sum gratiasque egi, ut debui. In novis tribunis plebis intellego spem te habere. Id erit firmum, si Pompeii voluntas *erit*, sed Crassum tamen metuo.—Cicero, Ad familiares, 14, 2

praesto=show

c PALLAS WELCOMES AENEAS AND HIS COMPANIONS

Euandrum petimus. Ferte haec, et dicite lectos
Dardaniae venisse duces, socia arma rogantis.
Obstipuit tanto perculsus nomine Pallas:
Egredere o quicumque es, ait, coramque parentem
Adloquere, ac nostris succede *penatibus* hospes.
Excepitque manu, dextramque amplexus inhaesit.
Progressi subeunt luco, fluviumque *relinquunt.*

percello=affect deeply Virgil, Aeneid, 8, 119–125

6 Translate into Latin [Do not use rare or poetic constructions]: If Commius had arrived that day with his army, he would have seized the hill which was not far from the camp of the Romans.

7 Translate into Latin [Do not use rare or poetic constructions]: When Cicero was in exile, he was not able to write to his wife without weeping, since he knew that she was unhappy without him.

8 Give the syntax of *Romanorum*, *precibus*, *custodiis*, *imperii*, *passibus*, *milia* (*a*), *me* (*b*, line 1), *miserrimas*, *merito* (*b*), *penatibus* (*c*).

9 Give the reason for the mode of *accessissent*, *iuvarent* (*a*), *putare*, *scribam*, *praestitissem* (*b*), *erit* (*b*, line 11). Write the principal parts of *coguntur* (*a*), *relinquunt* (*c*).

10 Translate into English:

Sed ubi Metellus in Africam venit, exercitus ei traditur a Sp. Albino pro consule iners, imbellis, neque periculi neque laboris patiens, lingua quam manu promptior, praedator ex sociis et ipse praeda hostium, sine imperio et modestia habitus. Ita imperatori novo plus ex malis moribus sollicitudinis quam ex copia militum auxili accedebat.

—Sallust, Bellum Iurgurthinum, 44

11 Write a brief account of *two* of the following: Ovid, Crassus, Aeneas, Pompey.

12 Translate into English:

Quod mare non novit, quae nescit Ariona tellus?
  Carmine currentes ille tenebat aquas.
Saepe sequens agnam lupus est a voce retentus,
  Saepe avidum fugiens restitit agna lupum.
Saepe canes leporesque umbra cubuere sub una,
  Et stetit in saxo proxima cerva leae.—Ovid, Carmina, 3

lea=lioness

13–14 Translate into English:

Adhuc, C. Caesar, Q. Ligarius omni culpa vacat. Domo est egressus non modo nullum ad bellum, sed ne ad minimam quidem suspicionem belli: legatus in pace profectus est: in provincia pacatissima ita se gessit, ut ei pacem esse expediret. Profectio certe animum tuum non debet offendere: num igitur remansio? Multo minus. Nam profectio voluntatem habuit non turpem, remansio necessitatem etiam honestam. Ergo haec duo tempora carent crimine: unum, cum est legatus profectus, alterum, cum efflagitatus a provincia praepositus Africae est. Tertium tempus est, quod post adventum Vari in Africa restitit, quod si est criminosum, necessitatis crimen est, non voluntatis.—Cicero, Pro Ligario, 2

careo=free from

15 Write Latin sentences in which *cum* (concessive), *priusquam*, *ut non*, *ut ne* and *quoniam* are used to introduce subordinate clauses.

High School Department

169TH EXAMINATION

LATIN—Third Year

Tuesday, June 18, 1901—1.15 to 4.15 p. m., only

Answer the first six questions and four of the others but **no more.** *If* *ore than four of the others are answered only the first four answers* *ill be considered. Division of groups is not allowed. Each complete* *nswer will receive 10 credits. Papers entitled to 75 or more credits* *ill be accepted.*

1–5 Translate into English:

ASSEMBLY AT CORDOVA

Itaque duabus legionibus missis in ulteriorem Hispaniam ım Q. Cassio *tribuno* plebis ipse cum equitibus sexcentis ıagnis itineribus *progreditur*: edictumque praemittit, ad uam diem magistratus principesque omnium civitatum *sibi* sse praesto Cordubae *vellet.* Quo edicto tota *provincia* perulgato, nulla fuit civitas, quin ad id tempus partem *senatus* *'ordubam mitteret;* nullusve civis Romanus paulo notior, uin ad diem conveniret. Simul ipse Cordubae conventus er se portas Varroni *clausit;* custodias vigiliasque in muro urribusque disposuit.—Caesar, De bello civili, 2, 19

WISDOM OF LAELIUS

Fannius—Sunt ista, Laeli, nec enim melior vir fuit *Africano* uisquam nec clarior. Sed existimare *debes omnium* oculos .unc in te esse coniectos; unum te *sapientem* et appellant et xistimant. Tribuebatur hoc modo M. Catoni; scimus L. Atilium apud patres nostros appellatum esse sapientem: sed ıterque alio quodam modo; Atilius quia prudens *esse* in iure ivili putabatur; Cato quia multarum rerum usum habebat; ropterea quasi cognomen iam habebat in senectute sapientis.

—Cicero, De amicitia, 2

AENEAS APPEARS BEFORE LAURENTUM

Vix e conspectu exierat campumque tenebat,
Cum pater Aeneas, saltus ingressus apertos,
Exsuperatque iugum silvaque evadit opaca.
Sic ambo ad muros rapidi totoque feruntur
Agmine, nec longis inter se *passibus* absunt,
Ac simul Aeneas fumantis *pulvere* campos
Prospexit longe Laurentiaque agmina vidit,
Et saevum Aenean *adgnovit* Turnus in armis
Adventumque pedum flatusque audivit equorum.

—Virgil, Aeneid, 11, 903–911

6 Translate into Latin [Do not use rare or poetic construcons]: Having sent the cavalry ahead, Caesar advanced with ree legions to meet the chief men of the state at Cordova, a ty of farther Spain.

7 Translate into Latin [Do not use rare or poetic constructions]: Fannius said that Cato and Atilius were considered wise; the former, on account of his experience in many things, the latter, because he was very prudent.

8 Give the syntax of *tribuno*, *sibi*, *provincia*, *senatus*, *Cordubam* (*a*), *Africano*, *omnium* (*b*), *sapientem* (*b*, line 3), *passibus*, *pulvere* (*c*).

9 Give the reason for the mode of *vellet*, *mitteret* (*a*), *esse* (*b*, line 6); for the tense of *progreditur* (*a*). Write the principal parts of *clausit* (*a*), *debes* (*b*), *adgnovit* (*c*).

10 Translate into English:

Marius postquam confecto negotio quo intenderat Cirtam redit, de adventu legatorum certior factus illosque et Sullam venire iubet, item L. Bellienum praetorem Utica, praeterea omnis undique senatorii ordinis, quibuscum mandata Bocchi cognoscit. Legatis potestas eundi Romam fit ab consule: interea indutiae postulabantur.

—Sallust, Bellum Iugurthinum, 104

cognosco=discuss, *indutiae*=truce

11 Write on *one* of the following, touching on causes, principal events and results: *a*) the civil war between Caesar and Pompey, *b*) the war with Jugurtha.

12 Translate into English:

Iam mihi deterior canis aspergitur aetas,
  Iamque meos vultus ruga senilis arat:
Iam vigor et quasso languent in corpore vires;
  Nec, iuveni lusus qui placuere, iuvant.
Nec, si me subito videas, agnoscere possis:
  Aetatis facta est tanta ruina meae.

—Ovid, Epistulae ex Ponto, 1, 4

13–14 Translate into English:

Accepi ab Aristocrito tris epistulas, quas ego lacrimis prope delevi. Conficior enim maerore, mea Terentia, nec me meae miseriae magis excruciant quam tuae vestraeque. Ego autem hoc miserior sum quam tu, quae es miserrima, quod ipsa calamitas communis est utriusque nostrum, sed culpa mea propria est. Meum fuit officium vel legatione vitare periculum vel diligentia et copiis resistere vel cadere fortiter. Hoc miserius, turpius, indignius nobis nihil fuit.

Qua re cum dolore conficior tum etiam pudore. Pudet enim me uxori meae optimae, suavissimis liberis virtutem et diligentiam non praestitisse.—Cicero, Ad familiares, 14, 3

15 Write original Latin sentences illustrating *a*) *three* ways of expressing purpose, *b*) the use of *each* of the periphrastic conjugations.

High School Department

167TH EXAMINATION

LATIN PROSE COMPOSITION

Monday, January 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Translate into Latin [Do not use rare or poetic constructions]:

1 Caesar decided to hasten into Gaul before a great number of the enemy should assemble in one place.

2 Miltiades, fearing lest he should be conquered by the Persian fleet, returned to Athens with his forces.

3 There are those who think that Cicero ought to drive Catiline and his associates from the city.

4 If Caesar had permitted them, the Helvetians would have marched through our province.

5 When Xerxes led his army against Greece, the Athenians asked the gods how they should defend themselves.

6 We must fortify the camp lest the Nervii hasten from the nearest forest and capture our army.

7 Lysander, having captured the Athenian fleet, attempted to hold the chief power and to become king of all Greece.

8–9 Would that I might free my native land from these great evils which threaten it, even if I should do this with great peril to myself and friends.

10–11 The ambassador that Caesar had sent reported that all the rest of the Belgians were in arms and that part of the Germans had united with the Belgians.

12–13 We have not a great number of brave men like Pompey, from whom we may select a commander for the war which we intend to wage in Asia.

14–15 Alcibiades was feared by the Lacedaemonians because he was shrewd in council. Having lost all his possessions, he fled to Pharnabazus, who at first received him kindly, but afterward ordered him to be killed.

drive = *pello*, attempt = *conor*, become = *fio*, threaten = *immineo*, intend = *in animo habeo*, shrewd = *callidus*, kindly = *liberaliter*, afterward = *postea*

High School Department

169TH EXAMINATION

LATIN PROSE COMPOSITION

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., **only**

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Translate into Latin [Do not use rare or poetic constructions]:

1 Hannibal, fearing that he would be given up, went to Crete after Antiochus had been defeated.

2 There is no doubt that it is better to banish this man than to put him to death.

3 Unless the Helvetians retreat during the night, the Romans, with a large army, will attack them at daybreak.

4 On the fifth of December, Cicero called the senate together and asked what should be done with the conspirators.

5 The Belgians laid waste all their fields and burned their villages, that the Romans might be cut off from supplies.

6 Caesar decided that he ought to wait till the Germans should be distant from the camp less than five hundred paces.

7 It is worth while for me to encounter this odium, provided that the danger of the conspiracy is averted from you.

8–9 After the envoys had reached Athens, Themistocles went before the senate of the Lacedaemonians and said, "I myself have advised the Athenians to build fortifications."

10–11 If Ariovistus had not been summoned by the Gauls, who had promised him large rewards, he would not have crossed the Rhine to make war on the Romans.

12–13 Alcibiades was condemned to death by the Athenians. While he was an exile in Sparta, he used to say that he was not fighting against his country but against his enemies.

14–15 It remains for me to speak of the authority of Quintus Catulus, for nothing is so great or so difficult that he can not control it by his wisdom or accomplish it by his ability.

retreat=*me recipio*, cut off=*intercludo*, encounter=*subeo*, go before=*adeo*, summon=*arcesso*, control=*rego*, ability=*virtus*

High School Department

166TH EXAMINATION

ARITHMETIC

Thursday, September 27, 1900—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but* no more. *If more than five of the others are answered only the first five answers will be considered. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1 Define *five* of the following: *ratio*, *insurance*, *discount*, *brokerage*, *cancelation*, *prime number*, *power*.

2 Simplify $1 \div \frac{3\frac{1}{2} - 2 \times \frac{3}{8} + 1}{.125 \div .005 - 12\frac{1}{2}}$

3 The weight of a column of water whose base is 6 centimeters square is $1\frac{4}{5}$ kilograms; find the hight of the column. How many liters are there in the column?

4 From November 29, 1899 till the present date $450 has gained $14.90 interest; find the rate of interest.

5 Oil is sold at the rate of $28\frac{1}{2}$ cents a gallon at a loss of 5%; find the cost per pint.

6 How many shares of stock at 4% discount can be bought for $3076, if the broker charges $\frac{1}{8}$%?

7 The proceeds of a note for 3 months discounted at a bank at 4% is $354; find the face of the note.

8 Find the cost of 18 planks, 16 feet 8 inches long, 14 inches wide and $2\frac{1}{2}$ inches thick, at $24 per M.

9 What will it cost to carpet, in the most economical way, a room 36 feet by 20 feet, with matting 27 inches wide, at 45 cents a yard?

10 A commission merchant received $451 to invest in flour; after taking out his commission of $2\frac{1}{2}$% how many barrels of flour did he buy at $5.50 a barrel?

11 A man sold two horses for $124 each, on one he gained 20% and on the other he lost 20%; find the whole gain or loss.

12 Find the contents in gallons of a cylindric cistern that is 4 feet in diameter and 5 feet high. [1 gallon = 231 cubic inches.]

13 It takes A three fourths as long to do a piece of work as it does B, it takes B twice as long as it does C; if C can do the work in 3 days, how long will it take A, B and C working together?

14 Find the cost of plastering the walls and ceiling of a room 16 feet by 9 feet and 12 feet high, at 38 cents a square yard, making an allowance of $\frac{1}{6}$ for openings.

15 Find a mean proportional between 867 and 48, and write the proportion.

High School Department

167TH EXAMINATION

ARITHMETIC

Thursday, January 24, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: abstract number, fraction, multiple, square root, dividend, tax, reciprocal.

2 Simplify $\dfrac{\dfrac{2-\frac{1}{8}}{2\frac{3}{4}} \div (2-1\frac{3}{5}+\frac{7}{10})}{\frac{3}{4}-\frac{1}{8} \div \frac{1}{2}}$

3 Find the simple interest of $5000 at $4\frac{1}{2}$% from August 25, 1900 till the present date.

4 A tank is $2\frac{1}{2}$ meters long, 80 centimeters deep and 5 decimeters wide; find the capacity of the tank in liters and the weight in kilograms of the water required to fill the tank.

5 Reduce to its lowest terms $\frac{1024}{3074}$

6 A man sold 15 bushels of potatoes at 60 cents a bushel thereby gaining $2.25; find the rate per cent of gain.

7 To what depth will 240 gallons fill a vat 11 feet long and 7 feet wide? [1 gallon=231 cubic inches.]

8 Make a receipted bill of the following: John Drew bought of Taylor & Co. January 3, 1901, 25 plank 10 feet long, 8 inches wide and $1\frac{1}{2}$ inches thick, at $16 per M; January 17, 12 sticks of timber 28 feet long and 8 inches square at $30 per M.

9 What is the difference between a discount of 10% and two successive discounts of 5% each on a bill of $832?

10 George Dent gives you today a note for $480 for 3 months without interest; write the note and find the proceeds if it is discounted today at a bank at 6%.

11 A man pays $36 for an insurance of $4800 which is $\frac{3}{4}$ the value of his house; find the rate of insurance and the value of his house.

12 A merchant buys through an agent 120 pounds of tea at 60 cents a pound and pays $1.44 commission; find the rate of the agent's commission and the net cost of the tea to the merchant.

13 Find the cost of digging a cellar 48'×36' and $7\frac{1}{2}$' deep at 30 cents a cubic yard.

14 The area of a lawn whose length is twice its breadth is 392 square yards; find the length and breadth of the lawn.

15 A man sells 540 shares of 4% stock at 80 and loans the proceeds at $5\frac{1}{2}$%; find the difference in his income.

High School Department

168TH EXAMINATION

ARITHMETIC

Thursday, March 28, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Simplify $\dfrac{\frac{9}{10} \div (\frac{1}{6} + \frac{3}{10} + \frac{11}{15})}{1\frac{5}{6} \times 3\frac{3}{4} - 5\frac{1}{4} \div 1\frac{2}{5}}$

2 What decimal part of 4 bushels, 1 peck, 6 quarts is $\frac{1}{3}$ of 9 bushels, 3 pecks, 7 quarts, 1 pint?

3 A tank is 6.5 meters long, 4.2 meters wide and 2.6 meters deep; how many hours will it take a pipe to fill the tank if 169 liters of water flow into the tank per minute?

4 Find the exact contents in cubic feet of a cellar wall 40′×32′ outside measurement, 8′ high and 18″ thick, allowing for one door 8′×5′ and three windows each $1\frac{1}{2}$′×3′.

5 Find the amount of $734 at $3\frac{1}{2}$% simple interest from June 30, 1898 to the present date.

6 Define *five* of the following: decimal, common divisor, prime number, multiplicand, integer, per cent, brokerage.

7 Find the least common multiple of 765 and 1428.

8 How deep must a bin be that is 16′×7′ in order to hold 420 bushels? [2150.4 cubic inches=1 bushel.]

9 Find the proceeds of a note for $500, payable in 90 days, without interest, if discounted at a bank at 6%, 40 days after date.

10 If 240 pounds of sugar are sold for $19.20 at a gain of 28%, what was the cost per pound?

11 An agent's commission of $2\frac{1}{2}$% is $47.85; what sum must be sent him to cover both his commission and the sum invested?

12 When 6% bonds are selling at $166\frac{1}{2}$, brokerage $\frac{1}{8}$%, how much must be invested to secure an income of $840?

13 A and B start from the same point, traveling in the same direction at the rate of 3 miles and 2 miles an hour respectively; if A starts 2 hours after B, how far apart are they 5 hours after A starts?

14 At 9 cents a square yard what is the cost of painting the outside surface of a hollow cylinder 8 feet long and 5 feet in diameter?

15 How much tax will a farmer pay who is assessed for 275 acres of land at $18 an acre, and for $2500 personal property, the tax rate being $5\frac{1}{2}$ mills on a dollar and the fee for collecting 1%?

High School Department

169TH EXAMINATION

ARITHMETIC

Thursday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but no more. If more than five of the others are answered only the first five answers will be considered. Give all operations (except mental ones) necessary to find results. Reduce each result to its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1 Define *five* of the following: concrete number, prime number, cancelation, commission, ratio, negotiable note, indorsement.

2 Simplify $\left(\frac{\frac{9}{4}-\frac{2}{3}}{\frac{7}{8}-\frac{3}{4}}+\frac{4}{5}+\frac{3}{8}\times\frac{8}{9}\right)\div 7$

3 Find the greatest common divisor and the least common multiple of 646 and 425.

4 A rectangular plot of ground is surrounded by a walk 1 meter 7 decimeters wide; the dimensions of the plot, including the walk, are 37 meters 4 decimeters by 30 meters 4 decimeters. Find the area of the walk in square meters.

5 Find the simple interest of $620 at 4½% from September 27, 1900 to the present date.

6 A merchant marks an article $6, but selling it at a discount of 10% for cash, gains 20%; find the cost of the article.

7 Find the cost, @ 16¢ a square yard, of plastering the walls and ceiling of a room 18′×16′ and 12′ high, allowing 75 square feet for openings.

8 A merchant buys through an agent 640 yards of carpet @ 75¢ a yard and pays ¾% commission; the freight bill is $2.80. What is the lowest price a yard at which the merchant can sell the carpet without loss?

9 A person failing in business owes $10,800 and has property worth $7200; what will a creditor receive whose claim is $180?

10 The distance around a circular park is 314.16 rods; find the area of the park.

11 A man sold through a broker 176 shares of stock @ 96¼, brokerage ⅛%; what sum should the broker remit?

12 A cylindric cistern 6 feet deep is 7 feet in diameter; how many gallons will it hold? [1 gallon=231 cubic inches.]

13 Find the square root of 129.2769.

14 A four months note for $584, without interest, is discounted at a bank at 5% on the day of its date; find the proceeds of the note.

15 A block insured for $7500 at ¼% is destroyed by fire at the end of 8 years and the company pays ⅘ of the claim; what part of the insurance received is the total premium paid?

High School Department

167TH EXAMINATION

ADVANCED ARITHMETIC

Monday, January 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Give each step of solution. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Find to *three* decimal places the product of 79430 and .00068 by contracted multiplication. Explain fully how the position of the decimal point is determined.

2 Test the divisibility of 523464 by each of the following numbers without dividing it by them: 3, 6, 8.

3 Reduce $.\dot{6}\dot{7}$ to a common fraction, giving the reasons in full.

4 A pipe $1\frac{1}{3}$ inches in diameter fills a reservoir in $1\frac{1}{2}$ hours; what is the diameter of a pipe that will fill the reservoir in 24 minutes?

5 A field in the form of an equilateral triangle requires 72 rods of fencing; find the area of the field.

6 Goods are bought at successive discounts of 5% and 20% from the list price and are sold at a gain of $12\frac{1}{2}$%. What per cent must be deducted from the list price to give the selling price?

7 When it is 1.30 p. m. at Rome 12° 27′ east longitude, what time is it at Philadelphia 75° 10′ west longitude? Give the reason for each step in solution.

8 Two bodies attract each other with a force *f* at a distance of 64 meters; find the force of attraction when the bodies are 48 meters apart. [The attraction of two bodies varies inversely as the square of the distance between their centers.]

9 Find the square root, to *two* decimal places, of 5729. Give a full explanation of the following: *a*) separation into periods, *b*) formation of the trial divisor, *c*) completion of the trial divisor.

10 Find the cost of a bill of exchange on London for £216 5s 8d sterling, when exchange is at $4.85.

11 Find the entire surface of a square pyramid whose altitude is 15 inches and a side of whose base is 16 inches.

12 Derive the formula for finding the sum of an arithmetic series when the extremes and the number of terms are given. Apply the formula in finding the sum of the terms of a series of 10 terms whose extremes are 5 and 32.

13 Find the net cost of 15 pieces of silk, each containing 50 yards, invoiced at 45 cents a yard, the duty being 9 cents a yard and 22% ad valorem.

14 The radius of a sphere is 6 inches; find the surface of a sphere whose volume is $\frac{1}{27}$ the volume of the first sphere.

15 Define *five* of the following: circular (continued) fraction, repetend, gram, bond, net cost, specific duty, international date line.

High School Department

169TH EXAMINATION

ADVANCED ARITHMETIC

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Give each step of solution. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: power, duty, bond, trade discount, progression, domestic exchange, compound interest.

2 Multiply 63,147 by 2594. Check the product by casting out nines and demonstrate the principle employed.

3 Show why 8 must be a factor of the product of any two consecutive even numbers.

4 The sides of a triangle are 12 inches, 16 inches and 20 inches respectively; find the area of a similar triangle whose longest side is 15 inches.

5 Extract the cube root of 30,371.328. Give an algebraic explanation of the method used.

6 From 150 pounds of milk containing $4\frac{1}{2}\%$ of butter fat, 20 pounds of cream containing 25% of butter fat are removed; find the per cent of the butter fat in the remainder.

7 When exchange is at par, express £125 in *a*) French francs, *b*) German marks, *c*) United States dollars.

8 A cylinder and a sphere have equal surfaces; the cylinder is 4 inches high and its base is 6 inches in diameter. Find the radius of the sphere.

9 What is the present value of a bond for $2000 bearing interest at 4%, payable semiannually, and having two years to run, money being worth 5% per annum?

10 Without dividing, test the divisibility of 919,292 and 15,624,323 by 11. State the principle applied.

11 A merchant was offered goods by one dealer at a discount of 30%, and by another at discounts of 20%, 5% and 5%, the list prices being the same. He accepted the better offer and sold the goods for 15% off the list price; find his gain per cent.

12 A pendulum 5 decimeters long makes 72 oscillations in a given time; how long must a pendulum be to make 60 oscillations in the same time? [The lengths of pendulums are inversely proportional to the squares of the numbers of oscillations in a given time.]

13 If $a:b::c:d$, prove that $ad=bc$ and that $a-b:a::c-d:c$. Give an axiom for *each* step.

14 The first three terms of a series are $1\frac{1}{3}$, $\frac{8}{9}$, $\frac{16}{27}$; find *a*) the seventh term, *b*) the sum of the first six terms.

15 A note for $2500 at 5%, dated Sept. 25, 1900, bears the following indorsements: Dec. 13, 1900, $327; Feb. 25, 1901, $20; May 1, 1901, $912. How much is due today?

High School Department

165TH EXAMINATION

ALGEBRA

August 1900—Three hours, only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: *trinomial*, *surd*, *exponent*, *elimination*, *evolution*, *common multiple*, *equation*.

2 Simplify $x-[ax-\frac{1}{2}\{a+x-\overline{ax+x}-(x-a)2\}]$

3 Simplify $\dfrac{\dfrac{2}{1-a^2}\div\left(\dfrac{1}{1-a}-\dfrac{1}{1+a}\right)}{\dfrac{1}{2}+\dfrac{2(a^2-\frac{1}{4})}{2a+1}}$

4 Factor $a^2-\frac{8}{4}ay-\frac{1}{4}y^2$, $54x^4+16x$, a^2+a-9b^2+3b, $16(a-b)^3+2$, $8a^2-6ay-9y^2$

5 Reduce to its lowest terms $\dfrac{2a^4-2a^3+a^2+3a-6}{4a^4-2a^3+3a-9}$

6 The square described on the hypotenuse of a right triangle is 180 square inches, the difference in the lengths of the legs of the triangle is 6; find the legs of the triangle.

7 Expand by the binomial theorem $\left(\dfrac{2x}{a^2}-\dfrac{1}{2}\right)^4$

8 Solve $\begin{cases} x-y=3 \\ x^2+2xy-3y^2=21 \end{cases}$

9 Extract to four terms the square root of x^2-2y

10 Solve $\dfrac{3\sqrt{x}-\sqrt{2}}{2\sqrt{x}+\sqrt{2}}=\dfrac{4-\sqrt{2x}}{2}$

11 It takes B twice as long as A to dig a ditch; A and C together can dig it in $2\frac{1}{17}$ days, B and C together can dig it in $2\frac{1}{12}$ days. In what time can A, B and C each dig the ditch?

12 Simplify $\sqrt[3]{a^{-1}\sqrt{b^3}}\div\sqrt{b\sqrt[3]{a}}$, $\dfrac{1}{\sqrt{6}-\sqrt{5}}+\dfrac{1}{\sqrt{5}-2}$

13 Solve $7x^3=8-x^6$

14 The sum of the contents of two cubic blocks is 407 cubic feet, the sum of the hights of the blocks is 11 feet; find an edge of each block.

15 Divide $x^3+y^3+z^3-3xyz$ by $x+y+z$

High School Department

166TH EXAMINATION

ALGEBRA

Tuesday, September 25, 1900—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Simplify $\dfrac{\left(\dfrac{a}{a-x}-\dfrac{ax}{a^2-x^2}\right)2x}{\dfrac{x}{(a+x)^2}-\dfrac{1}{a+\dfrac{a^2+x^2}{2x}}}$

2 Factor $x^4+x^2y^2+y^4$, $1-(a+c)^4$, $4-5a-6a^2$, $c^3-a^3+3a^2b-3ab^2+b^3$, $a^5b-81ab$

3 Simplify $2x-\{5y-\overline{3z+7}-[4+(x-\overline{5-3z}+2y)]\}$

4 Solve $\frac{2}{x}+y+z=3$, $\frac{1}{x}+2y+3z=2$, $\frac{3}{x}-3y+2z=11$

5 Solve $x(x-1)-a=-ax$

6 Find the greatest common divisor of a^4-a^3+8a-8 and $2a^3+8a^2-16a+48$

7 A fraction is such that if $\frac{1}{6}$ of its denominator be added to 4, the sum is $\frac{1}{2}$ of its numerator; the sum of $\frac{1}{4}$ of the numerator and $\frac{1}{18}$ of the denominator is 3. Find the fraction.

8 Multiply $a^r+a^{r-1}b+a^{r-2}b^2$ by a^2-ab+b^2

9 Expand by the binomial theorem $(2-\frac{1}{2}x)^5$

10 Extract the cube root of $\frac{1}{x^3}-\frac{3}{x^2}+5-3x^2-x^3$

11 Solve $\begin{cases} x^3-y^3=61 \\ xy^2-x^2y=-20 \end{cases}$

12 When the sum of two numbers is multiplied by the greater number the product is 28; when the sum is multiplied by the smaller number, the product is 21. Find the numbers.

13 Simplify $\frac{ab}{y}\sqrt[3]{-\frac{27x^2y^4z^3}{a^2b}}$, $\sqrt{\frac{ab}{2}}\times\sqrt[3]{8ab^2}$, $\frac{2\sqrt{a}-\sqrt{b}}{2\sqrt{a}+\sqrt{b}}$, $\frac{1}{\sqrt{18}}+4\sqrt{\frac{1}{2}}-\sqrt{8}$

14 Solve $\sqrt{x+2}-\sqrt{x-6}=\sqrt{2x-10}$

15 Define *five* of the following: ***rationalization***, ***similar radicals***, *root of an equation*, *affected quadratic*, ***coefficient***, ***degree of an equation***, *polynomial*.

High School Department

167TH EXAMINATION

ALGEBRA

Monday, January 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Simplify $x^2-\{-x-x(x-1)-(x^2-2)-2[x^2-\overline{1+x}]\}$

2 Simplify $\dfrac{2a\left(\dfrac{b}{a-b}\right)}{\dfrac{3a}{2a-2b}}\div\dfrac{b}{a+\dfrac{3-a}{4}}$

3 Factor *five* of the following: a^4-a, $6a^2+5a-6$, x^4+x^2+1, $a^2-(b^2+2b+1)$, $64a^3+c^3$, $x^2y-xyz-xb+bz$, x^4-y^4

4 Solve $\begin{cases}2x-3y-z=6\\3x+5y+4z=5\\x+2y+z=1\end{cases}$

5 Solve $\dfrac{6}{x+1}+\dfrac{3}{x-1}=5$

6 The difference of the squares of two consecutive numbers is 27; find the numbers.

7 Extract the square root of $49a^4-\dfrac{14a^3}{5}+\dfrac{1051a^2}{25}-\dfrac{6a}{5}+9$

8 Find the greatest common divisor (highest common factor) of $6m^3-7m^2+1$ and $4m^4-9m^2+6m-1$

9 Solve $\begin{cases}x^2-y^2=45\\xy+y^2=18\end{cases}$

10 Divide $x^{4a}+4x^{3a}y+6x^{2a}y^2+4x^ay^3+y^4$ by $x^{2a}+2x^ay+y^2$

11 Expand by the binomial theorem $\left(2x^2-\dfrac{2}{x^2}\right)^4$

12 Solve $\sqrt{2x-2}+\sqrt{x}=\sqrt{6x-5}$

13 The area of a right triangle is 30 square inches; the sum of its base and altitude is 17 inches. Find the base and altitude.

14 Simplify $\sqrt{12a^2}-\sqrt{\dfrac{3a^2}{4}}+\sqrt[3]{27}$; $\dfrac{a}{2}\sqrt{\dfrac{4}{15a}}\times 3a\sqrt{\dfrac{3}{5a}}$; $\dfrac{a+b}{a-b}\sqrt{\dfrac{a-b}{a+b}}$

15 Define *five* of the following: simple equation, index, radical, involution, binomial, elimination, pure quadratic.

High School Department

168TH EXAMINATION

ALGEBRA

Thursday, March 28, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: trinomial, involution, exponent, affected quadratic, literal equation, elimination, degree of a term.

2 Simplify $a^2-[a-(a+b)(a-1)+ab-\{-\overline{b+a^2}+2(a+b)\}]$

3 Simplify $\dfrac{\left(x-\frac{1}{x}\right)^2}{\left(1+\frac{1}{x}\right)\left(1-\frac{1}{x}\right)^2}\left(\frac{1-x}{x}+\frac{x}{1+x}\right)$

4 Factor $2a^2+23a-12$, $27a^3-8$, $mn+n^2y-mx-nxy$, x^7+y^7, $18-2a^2-4ab-2b^2$

5 Solve $\dfrac{x-3b}{c}=\dfrac{9(c-b)}{x}$

6 Multiply $x^{\frac{5}{2}}-x^2y^{\frac{1}{3}}+x^{\frac{3}{2}}y^{\frac{2}{3}}-xy+x^{\frac{1}{2}}y^{\frac{4}{3}}-y^{\frac{5}{3}}$ by $x^{\frac{1}{2}}+y^{\frac{1}{3}}$

7 Solve $\begin{cases}\dfrac{a}{x}+\dfrac{c}{y}=b\\[2ex]\dfrac{c}{x}+\dfrac{a}{y}=d\end{cases}$

8 The sum of the reciprocals of two numbers is 7 and the sum of the reciprocals of their squares is 25; find the numbers.

9 Find the greatest common divisor (highest common factor) of $9a^3-a-2$ and $3a^4+2a^3-8a^2-6a-3$

10 Extract the cube root of $-x^6-6x^5+40x^3-96x+64$

11 If the width of a certain rectangle is increased by 2 inches, the area of the rectangle is 12 square inches; if the length is increased by 1 inch, the area of the rectangle is 8 square inches. Find the sides of the rectangle.

12 Solve $\begin{cases}x-2y=2\\ x^2-6y^2=74-xy\end{cases}$

13 Expand by the binomial theorem $\left(\dfrac{1}{x^2}-\dfrac{x}{3}\right)^6$

14 Simplify $3\sqrt{63}-\sqrt{112}-12\sqrt{3\frac{1}{7}}$, $\dfrac{1}{a+\sqrt{2}}+\dfrac{1}{a-\sqrt{2}}$, $(a\sqrt{b}-b\sqrt{a})(\sqrt{b}+\sqrt{a})$

15 Solve $\sqrt{2x+11}-\sqrt{x-3}-\sqrt{x+2}=0$

High School Department

169TH EXAMINATION

ALGEBRA

Monday, June 17, 1901—9.15 a. m. to 12.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Division of groups is not allowed. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Simplify $\dfrac{x-y}{1+\dfrac{x-y}{x+y}} \div \dfrac{\dfrac{x}{x-y}-1}{1-\dfrac{x}{x+y}} \times \dfrac{2x}{(x-y)^2}$

2 Factor *five* of the following: x^6+x, $2a^2+13a-24$, a^4-81, $ay+by-a-b$, $a^4+a^2b^2+b^4$, a^3+216, $b^2-a^2+2ac-c^2$

3 Find the least common multiple of $2ab^3-10ab-4a$ and $2b^3-2b+12$

4 Solve $\frac{1}{x}+\frac{2}{y}-\frac{1}{z}=3\frac{1}{2}$, $\frac{2}{x}-\frac{1}{y}+\frac{3}{z}=-3$, $\frac{1}{x}-\frac{3}{y}-\frac{2}{z}=-\frac{1}{2}$

5 Solve $5x^2-15x=32-2x^2+5x$

6 A man says that $\frac{3}{4}$ of his age two years ago is equal to $\frac{2}{3}$ of his age three years hence; find his present age.

7 Multiply $2+a^{-1}-a^{-2}$ by a^2-a-2

8 Solve $x+\sqrt{b^2+x^2}=\dfrac{2b^2}{\sqrt{b^2+x^2}}$

9 The sum of the three digits of a number is 9, the digit in the hundreds place is $\frac{1}{2}$ that in the units place; if the digits are reversed the new number exceeds the original number by 198. Find the number.

10–11 Solve $\begin{cases} 2x^2-3xy+2y^2=8 \\ y^2-x^2=5 \end{cases}$

12 Simplify $\sqrt[3]{a^2}\times\sqrt[4]{a^3}$; $\sqrt[3]{\sqrt[4]{a^3}}$; $\dfrac{\sqrt{48}-\sqrt{27}}{\sqrt{12}}$; $3\sqrt[3]{54}-2\sqrt[3]{\frac{1}{4}}$

13 Write out by the binomial theorem the first *three* terms of $(2x^2-y^3)^8$, giving all the work for finding the coefficients.

14 The sum of the perimeters of two squares equals 140 feet; the sum of their areas equals 617 square feet. Find the side of each square.

15 Define *five* of the following: axiom, common factor, polynomial, numeric equation, simultaneous equations, quadratic equation, surd.

High School Department

167TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, January 22, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: cubic equation, commensurable root, conjugate imaginaries, series, harmonic progression, continued proportion.

2 Divide $\sqrt[3]{x^2}+2x^{\frac{1}{3}}-16x^{-\frac{2}{3}}-\frac{32}{x}$ by $x^{\frac{1}{6}}+4x^{-\frac{1}{6}}+\frac{4}{\sqrt[4]{x}}$

3 Find the sixth root of the following expression:
$1+6x+15x^2+20x^3+15x^4+6x^5+x^6$

4 The number of square inches in the surface of a cube exceeds the number of linear inches in the sum of its edges by 210; find the volume of the cube.

5 Interpret the forms $\frac{a}{0}$, $\frac{a}{\infty}$, $\frac{0}{0}$

6 Find the square root of $a+b+\sqrt{2ab+b^2}$

7 How many different combinations of letters, each consisting of four consonants and one vowel, can be formed from 12 consonants and 3 vowels?

8 If A, G and H are respectively the arithmetic, geometric and harmonic **means** between a and b, prove that G is the geometric mean between A and H. Find the harmonic mean between 4 and 12.

9 Find by the binomial theorem the value of $\sqrt[4]{83}$ to *four* places of decimals.

10 Express $\frac{729}{2318}$ as a continued fraction and find its fourth convergent.

11 Expand $\sqrt{a^2-x^2}$ to *four* terms.

12 Resolve into partial fractions $\frac{4x-5x^2-21}{x^3-4x^2+x-4}$

13 Solve by use of logarithms $3^{x+2}=405$ (log. 3=.4771, log. 5 =.6990).

14 State Descartes's rule of signs and apply it to determine the nature of the roots of $3x^4+12x^2+5x-4=0$

15 Transform the following equation into another whose coefficients are integral, that of the first term being unity:
$2x^3-\frac{3}{2}x^2-\frac{1}{4}x+\frac{3}{16}=0$

High School Department

169TH EXAMINATION

ADVANCED ALGEBRA

Tuesday, June 18, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Give each step of solution. Reduce fractions to lowest terms. Express final result in its simplest form and mark it Ans. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define logarithm, series, surd, partial fraction, determinant.

2 Solve as a quadratic $x^4+6x^3+x^2-24x=20$

3 Divide $4\sqrt[3]{x^2}-8x^{\frac{1}{3}}-5+\frac{10}{\sqrt[3]{x}}+3x^{-\frac{2}{3}}$ by $2x^{\frac{5}{12}}-\sqrt[12]{x}-\frac{3}{\sqrt[4]{x}}$

4 How many different signals can be displayed by means of four triangular flags of different colors, using one or more than one at a time and arranging vertically?

5 Assuming the geometric series, $a+ar+ar^2+\ldots ar^{n-1}$, deduce a formula for finding the sum of an infinite decreasing geometric series.

6 Find the quotient of $x^5-4x^4-17x^3-13x^2-11x-10$ divided by x^2+3x+2, using the method of synthetic division.

7 Prove that any ordinary fraction in its lowest terms may be converted into a terminating continued fraction.

8 Expand $\frac{2x}{3-2x^2}$ to *five* terms of the ascending powers of x, using the method of undetermined coefficients.

9 Given log 3=.4771, log 5=.6990; find log 2, log 6, log .125, log $\frac{1}{15}$, log 250.

10 Form the equation whose roots are -2, -3 and 1; transform this equation into one whose roots are each 1 less than the roots of the original equation.

11 One of the roots of the equation $x^4-5x^3+5x^2+17x-42=0$ is $2-\sqrt{-3}$; find the other *three* roots of this equation.

12 Determine, by a general method, the equal roots of the equation $x^4-6x^3+9x^2+4x-12=0$

13 A, B and C start together from the same point and travel at the rate of a, b and c miles an hour respectively, around a circular island n miles in circumference, C going in a direction opposite to that taken by A and B; find when A and B will be together and when A and C will be together.

14 Find the factor that will rationalize $a^{\frac{1}{2}}+b^{\frac{1}{3}}$

15 Write in the usual form the general determinant of the second order. Show how this determinant may be applied in the solution of simultaneous equations.

High School Department

165TH EXAMINATION

PLANE GEOMETRY

August 1900 — Three hours, only

Answer eight questions but **no more,** *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division 1 Define *five* of the following: *variable, heptagon, convex polygon, perimeter, re-entrant angle, demonstration, secant.*

2 Prove that two right triangles are equal if a side and the hypotenuse of one are equal respectively to a side and the hypotenuse of the other.

3 Complete and demonstrate the following: an angle formed by two secants or two tangents intersecting without the circumference is measured by . . .

4 Prove that two triangles which have their sides respectively parallel or respectively perpendicular are similar.

5 Prove that two regular polygons of the same number of sides are similar.

Second division 6 Tangents 15 inches long are drawn from a point to a circle whose diameter is 16 inches; find the length of the chord joining the points of contact.

7 The radius of a circle is r; find the side of the inscribed octagon.

8 The sides of a triangle are 14 feet and 10 feet and its base is 8 feet; how far must the base be produced to meet the bisector of the exterior angle formed by producing one of the sides through the vertex?

9 One side of an angle of 30° inscribed in a circle is a diameter 12 inches long; find the area included by the sides of the angle and its intercepted arc.

10 The area of a triangle is 30 square inches, its base is 12 inches; find the area, base and altitude of the triangle cut off by a line joining the middle points of the sides of the triangle.

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ision

11 Prove that any two altitudes of a triangle are inversely proportional to their corresponding bases.

12 Prove that lines drawn through the vertices of a quadrilateral parallel to the diagonals form a parallelogram twice as large as the quadrilateral.

13 Prove that the line joining the middle points of the diagonals of a trapezoid is equal to half the difference of the bases.

14 Prove that the areas of two triangles which have an angle of the one supplementary to an angle of the other are to each other as the products of the sides including the equal angles.

15 The radius of a circle is a; show how to construct a concentric circle whose area will be three times the area of the given circle.

High School Department

166TH EXAMINATION

PLANE GEOMETRY

Wednesday, September 26, 1900—9.15 a.m. to 12.15 p.m., only

Answer eight questions but **no more,** *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive* $12\frac{1}{2}$ *credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Prove that if three or more parallels intercept equal parts on any transversal they intercept equal parts on every transversal.

2 Prove that in the same circle or equal circles, if two chords are unequally distant from the center, the greater chord is at the less distance.

3 Prove that if from a fixed point without a circle a secant is drawn terminating in the concave arc, the product of the secant and its external segment is constant.

4 Show how to construct a polygon similar to two given similar polygons and equivalent to their sum. Give proof.

5 Complete and demonstrate the following: the area of a regular polygon is equal to . . .

Second division

6 One leg of a right triangle is 24 inches, the perpendicular from the right angle to the hypotenuse is 19.2 inches; find the radius of the circumscribing circle.

7 Find the area of an equilateral triangle whose altitude is 3 inches.

8 The diameter of a circle is 12 inches; find the difference between the areas of two sectors, if the arc of the first and the chord of the second are each equal to the radius of the circle.

9 The sides of a rectangle whose area is 108 square inches have the ratio of 3 to 4; find the diagonal of the rectangle.

10 The area of a regular hexagon is 12 square inches; find the area of the circumscribed circle.

Third division

11 Prove that a circle can be circumscribed about an isosceles trapezoid.

12 Find the ratio between the diagonal and the perimeter of a square. Give proof.

13 What part of a parallelogram is cut off by a line drawn from any vertex to the middle point of one of the opposite sides? Give proof.

14 Prove that the equilateral triangle described on the hypotenuse of a right triangle, is equal to the sum of the equilateral triangles described on the legs.

15 Construct a right triangle, having given its hypotenuse and the perpendicular from the right angle to the hypotenuse.

High School Department

167TH EXAMINATION

PLANE GEOMETRY

Wednesday, January 23, 1901—9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more,** *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

st ision 1 Define *five* of the following: oblique angle, ratio, locus of a point, decagon, apothem, hypothesis, similar sectors.

2 Prove that the perpendicular bisector of a given line is the locus of points equidistant from the extremities of the line.

3 Prove that if two circles intersect, their line of centers is perpendicular to their common chord at its middle point.

4 Write *three* theorems that conclude "the triangles are similar." Demonstrate *one* of these theorems.

5 Prove that an equilateral polygon inscribed in a circle is a regular polygon.

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cond ision 6 The sum of the interior angles of a polygon is 16 right angles; how many sides has the polygon?

7 In a circle whose radius is 17 inches, an arc is subtended by a chord 30 inches long; find the length of the chord of half this arc.

8 Find the area of a quatrefoil formed by four semicircumferences described externally on the sides of a square as diameters, the side of the square being 3 inches.

9 A rectangular field whose width is 7 rods and a square field whose side is 14 rods, have equal areas; find the number of rods of fencing required to inclose each field.

10 Two equilateral triangles have a side of one equal to the altitude of the other; find the ratio of their areas.

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ird ision 11 Show how to divide one side of a given triangle into segments proportional to the other two sides. Give proof.

12 Prove that if two adjacent angles of a quadrilateral are right angles, the bisectors of the other angles are perpendicular to each other.

13 Prove that the diagonals of a trapezoid divide each other proportionally.

14 Show how to construct an equilateral triangle whose altitude is *a*.

15 Find the ratio of the perimeters of two equilateral triangles, one inscribed in a circle, the other circumscribed about the same circle. Give proof.

High School Department

168TH EXAMINATION

PLANE GEOMETRY

Wednesday, March 27, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer eight questions but no more, *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Two angles whose sides are perpendicular each to each are either equal or supplementary. Give proof for both cases.

2 Prove that two tangents to a circle drawn from an exterior point are equal, and make equal angles with the line joining the point to the center.

3 Prove that if two polygons are composed of the same number of triangles, similar each to each, and similarly placed, the polygons are similar.

4 Complete and demonstrate the following: the area of a trapezoid is equal to . . .

5 State the ratio that exists between the areas of two similar segments. Give proof.

Second division

6 The sides of a triangle are 18, 15 and 12 inches respectively; find the bisector of the largest angle.

7 From a point 12 inches from the center of a circle whose radius is 8 inches, a secant 16 inches long is drawn terminating in the concave arc; find the segments of the secant made by the circumference of the circle.

8 Find the area of a regular hexagon circumscribed about a circle whose radius is 4 inches.

9 The sum of the diagonals of a rhombus is 23 inches and one diagonal is 7 inches longer than the other; find the area and the perimeter of the rhombus.

10 Find the radius of a semicircle whose area is 88.3575 square inches.

Third division

11 Prove that the greater segments of two intersecting diagonals of a regular pentagon are equal.

12 Find the locus of the middle points of all chords of a given length that can be drawn in a given circle. Give proof.

13 Determine the ratio of the area of a rhombus to the area of the rectangle of its diagonals. Give proof.

14 AB and CD are unequal parallel chords; prove that AD and BC will intersect on the diameter perpendicular to the chords, or on this diameter produced.

15 The bisector of angle C of the inscribed triangle ABC cuts AB in D and the circumference in E; prove that AC : CD :: CE : BC.

High School Department

169TH EXAMINATION

PLANE GEOMETRY

Wednesday, June 19, 1901—9.15 a. m. to 12.15 p. m., only

Answer eight questions but **no more,** *including at least one from each of the three divisions. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division 1 Define *five* of the following: adjacent angles, trapezoid, heptagon, perimeter, quadrant, segment, diagonal.

2 Prove that if two triangles have two angles and the included side of one respectively equal to two angles and the included side of the other, the triangles are equal in all respects.

3 Prove that an inscribed angle is measured by one half the arc intercepted by its sides. Give *three* cases.

4 Give *three* conclusions to the following and demonstrate *one* of them: if in a right triangle a perpendicular is dropped from the vertex of the right angle to the hypotenuse . . .

5 Prove that the area of a circle is equal to *a*) one half the product of the radius and the circumference, *b*) π times the square of the radius [Derive *b* from *a*].

Second division 6 Find the perimeter of an equilateral triangle that is equal in area to a semicircle whose radius is *r*.

7 The base of a polygon is 4 feet; find the base of a similar polygon whose area is 2¼ times the area of the given polygon.

8 The radius of a circle is 10 inches; find the area of the segment of the circle subtended by a chord equal to the radius.

9 Find the side of the regular octagon inscribed in a circle whose radius is 8 inches.

10 From a point without a circle are drawn a secant 25 inches long terminating in the concave arc and a tangent 15 inches long; find the external segment of the secant.

Third division 11 Prove that if three alternate sides of a regular hexagon are produced till they meet, an equilateral triangle is formed.

12 Prove that the bisectors of the interior angles of a parallelogram form a rectangle.

13 Show how to construct an isosceles triangle when the base and the vertical angle are given. Give proof.

14 Prove that the lines joining the middle points of the sides of any quadrilateral form a parallelogram whose perimeter is equal to the sum of the diagonals of the quadrilateral.

15 Find the loci of the centers of circumferences situated as follows: *a*) tangent to two given straight lines, *b*) passing through two given points, *c*) tangent to a given straight line and having a given radius.

High School Department

167TH EXAMINATION

SOLID GEOMETRY

Friday, January 25, 1901 — 1.15 to 4.15 p. m., only

Answer eight questions but **no more,** *including at least two from each division. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Define *five* of the following: cone of revolution, octaedron, oblique prism, generatrix, spheric segment, polyedron, lune.

2 Prove that a line perpendicular to each of two straight lines at their point of intersection is perpendicular to the plane of those lines.

3 Prove that if two intersecting planes are each perpendicular to a third plane, their intersection is also perpendicular to that plane.

4 Prove that the acute angle which a straight line makes with its projection on a plane is the least angle which it makes with any line of the plane.

5 Complete and demonstrate the following: the volume of a triangular prism is equal to . . .

6 Complete and demonstrate the following: the lateral area of the frustum of a regular pyramid is equal to . . .

7 Prove that the volumes of two similar tetraedrons are to each other as the cubes of their homologous edges.

8 Prove that a side of a spheric triangle is less than the sum of the other two sides.

Second division

NOTE — Use π instead of its approximate value 3.1416.

9 Find the volume and surface of the solid generated by a door 3 feet wide and 8 feet high, swinging in an arc of 144°.

10 The hypotenuse of a right triangle is 5 inches, one leg is 3 inches; find the volume of the solid generated by revolving the triangle on its hypotenuse as an axis.

11 The base of a regular pyramid 8 inches high is a hexagon whose side is 6 inches; find the volume and entire surface of the pyramid.

12 Find the volume and surface of a cube inscribed in a sphere whose radius is 6 inches.

13 Find the entire surface of a hemisphere equivalent to a sphere whose radius is 8 inches.

14 Assuming that the radius of the earth is 4000 miles and that the crust is 30 miles thick, find the volume of the crust of the earth.

15 Prove that if a line is parallel to one plane and perpendicular to another, the two planes are perpendicular to each other.

High School Department

169TH EXAMINATION

SOLID GEOMETRY

Friday, June 21, 1901 — 1.15 to 4.15 p. m., only

Answer eight questions but **no more**, *including at least two from each division. If more than eight are answered only the first eight answers will be considered. Draw carefully and neatly each figure in construction or proof, using letters instead of numerals. Arrange work logically. Each complete answer will receive 12½ credits. Papers entitled to 75 or more credits will be accepted.*

First division

1 Define *five* of the following: adjacent diedral angles, diagonal of a polyedron, truncated prism, frustum of a pyramid, cylindric surface, zone, spheric polygon.

2 Prove that if two straight lines are intersected by three parallel planes, their corresponding segments are proportional.

3 Prove that if a straight line is perpendicular to a plane, every plane passed through the line is perpendicular to that plane.

4 Prove that two prisms are equal if three faces including a triedral angle of the one are equal respectively to the three faces including a triedral angle of the other and are similarly placed.

5 Complete and demonstrate the following: the lateral area of a regular pyramid is equal to . . .

6 Complete and demonstrate the following: the volume of a cone is equal to . . .

7 Prove that every section of a cone made by a plane passing through its vertex is a triangle.

8 Prove that the sum of the sides of a spheric polygon is less than 360°.

Second division

NOTE — Use π instead of its approximate value 3.1416.

9 Find the entire surface and the volume of a right prism 18 inches high whose base is a rhombus having diagonals 12 and 16 inches long respectively.

10 An iron hemisphere 8 inches in diameter is melted and cast into a right circular cylinder whose altitude is 6 inches; find the entire surface of the cylinder.

11 The circumferences of the upper and lower bases of a tower in the form of a frustum of a cone are 24 feet and 36 feet respectively; the distance between the bases is 4 feet. How many cubic feet must be added to the frustum to complete the cone?

12 Find the volume of a regular pyramid 15 inches high whose lateral edge is 17 inches and whose base is a triangle.

13 Find the volume of a sphere whose surface is S.

14 Prove that if a straight line intersects two parallel planes it makes equal angles with them.

15 Prove that the volume of a sphere is to the volume of the circumscribed cube as π is to 6.

High School Department

167TH EXAMINATION

TRIGONOMETRY

Thursday, January 24, 1901—9.15 a. m. to 12.15 p. m.

Answer eight questions but **no more.** [*Include at least three fr third group if credit is desired for both plane and spheric trigono If more than eight are answered only the first eight answers will sidered. Division of groups is not allowed. A, B and C repre angles of a triangle, a, b and c the opposite sides. In a right tri represents the right angle. Each complete answer will recei credits. Papers entitled to 75 or more credits will be accepted Give special attention to arrangement of work.*

First division 1 In a right triangle $\sin A = \frac{3}{5}$ and A is in the quadrant; find the numeric value and the algebra of *five* other functions of A.

2 Prove that $\frac{\sin A \sec A \cot A}{\sec A - \tan A} = \frac{1 + \cos A \tan A}{\cos A}$

3 Derive, without the use of the tables, the numeric v *each* of the following: sin 75°, cos 240°, cos 105°, tan 330°, c

4 Prove that the cosine of the sum of two angles is e the product of the cosines of the angles less the pro their sines.

5 Find the value of the sine of $\frac{1}{2}A$ and of the cosine in terms of cosine A.

Second division 6 The diagonals of a rectangle are each 63.8 fe and the acute angle between them is 73° 40′; find th of the rectangle.

7 Given $A = 78° \ 30'$, $a = 17.3$ feet, $b = 11.4$ feet; find maining parts.

8 Two sides of a triangular field 18.6 rods and 22.9 ro respectively, form an angle of 75° 25′; find the area of th

9–10 An observer on the bank of a stream finds the angle subtended by a tree on the opposite bank to be on walking back 24 feet from the bank he finds the ang tended by the tree to be 23° 47′. Find the width of the s

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Third division 11 Prove that in any spheric triangle the sines sides are proportional to the sines of the opposite

12 Given in a spheric triangle $A = 75°$, $B = 81°$, $C = 70°$;

13 Given in a spheric triangle $a = 42° \ 45'$, $b = 47° \ 15'$, 30′; determine whether more than one solution is p Give proof.

14 Find in miles the shortest distance between Na latitude 41° 15′ north, longitude 70° west, and Eastport, 44° 50′ north, longitude 67° west. [1° = 69.16 miles.]

15 Find the time of sunrise at Boston, latitude 42° 2 when the sun's declination is 14° north.

High School Department

169TH EXAMINATION

TRIGONOMETRY

ırsday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

wer eight questions but **no more.** *Include at least three from the ḷivision if credit is desired for both plane and spheric trigonometry. e than eight are answered only the first eight answers will be con- l. Division of groups is not allowed. A, B and C represent the of a triangle, a, b and c the opposite sides. In a right triangle C ɛnts the right angle. Each complete answer will receive 12½ . Papers entitled to 75 or more credits will be accepted. special attention to arrangement of work.*

1 Deduce, without using the tables, the numeric value of cos 45°, and from that result deduce the value of sin ′.

ʼrite the logarithms of .001, 100^5, $.0001^{-3}$, $\sqrt[3]{10}$, $\sqrt{.001}$

In any plane triangle the sum of two sides is to their ɛnce as . . .

ɔplete and demonstrate the above, assuming the values of nctions of the sum and of the difference of two angles.

rove that in any plane triangle $a=b \cos C+c \cos B$.

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6 Given in a plane triangle $a=125.6$ feet, $b=136.8$ feet $C=75° 15'$; find the remaining parts.

ɔ a circle whose radius is 6 feet, find the area of a segment chord is 10 feet.

ind the area of a regular pentagon whose side is 15 feet.

ɔ Show what measurements and what computations are ɜary to find the distance between two objects situated on rther bank of an impassable river opposite the observer. diagram and all formulas needed.]

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11 What are Napier's circular parts? State Napier's two rules for the solution of right triangles.

Given in an oblique spheric triangle $A=34° 15'$, $B=42°$ $=76° 37'$; find a, b and C.

Given $a=68° 46'$, $b=37° 10'$, $C=39° 24'$; find c, A and B.

15 **Explain** fully, using diagram and giving necessary las, how to find the time of day, when the altitude and ation of the sun and the latitude of the place are known.

High School Department

167TH EXAMINATION

ASTRONOMY

Thursday, January 24, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Mention an important contribution to astronomic science made by *a*) Leverrier, *b*) Hipparchus, *c*) Copernicus, *d*) Huygens, *e*) Kepler.

2 Mention *five* stars of the first magnitude, giving the situation and name of the constellation in which each lies.

3 Define horizon, celestial meridian, prime vertical, altitud azimuth.

4 Give a description of sun-spots, stating their appearanc size, distribution, periodicity, and a theory as to their natu

5 Give the shape and size of the earth. State the cause a *one* effect of the earth's shape.

6 Show by diagram the cause of the change of seasons, g ing the dates of the solstices and equinoxes.

7 Distinguish between the sidereal period and the syno period of a planet. Compare the four smaller planets with t four larger ones as to *a*) density, *b*) axial rotation, *c*) satellit

8 Draw diagrams showing the relative position of the he enly bodies and the paths of the light rays in *a*) a total so eclipse, *b*) an annular solar eclipse. At what time of the y are total eclipses most likely to occur and why?

9 Give a description of comets as to *a*) appearance, *b*) the as to physical constitution, *c*) orbits. Describe *two* remarka comets.

10 Describe a scientific method of determining the moti of stars.

11 Write on the planet Uranus, stating *a*) when and by wh discovered, *b*) size and distance from the sun, *c*) sidereal per *d*) satellites.

12 Give approximately the estimated distance of the nea star from the sun.

13 Describe the milky way and state a theory concernin

14 Give an account of the invention of the telescope. scribe by aid of a drawing a refracting telescope, showing position and shape of the lenses and the paths of the ra light.

15 Describe the spectroscope, stating *one* important use in astronomic work.

High School Department

169TH EXAMINATION

ASTRONOMY

Thursday, June 20, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Describe the Copernican system. State Kepler's first law of planetary motion.

2 Define ecliptic, celestial longitude, vernal equinox, solstice, zodiac.

3 Describe the genesis and the development of the solar system according to the nebular hypothesis.

4 Explain, by aid of a diagram, the apparent retrograde movement of an inferior planet.

5 Describe the planet Neptune as to *a*) size, *b*) distance from the sun, *c*) satellites.

6 Distinguish between *a*) the civil day and the astronomic day, *b*) the sidereal year and the tropical year. Explain why the sidereal year and the tropical year are unequal in length.

7 Define obliquity of the ecliptic. Explain the periodic changes in the obliquity of the ecliptic.

8 Explain the phenomenon of *a*) spring tides, *b*) neap tides. State the frequency of occurrence of each.

9 Explain, by aid of a diagram, the varying phases of the moon.

10 State the conditions necessary for an eclipse of the sun. Draw a diagram showing the relative positions of the sun, earth and moon, and the paths of the rays of light in a total eclipse of the sun.

11 Define *a*) declination, *b*) right ascension. State approximately the declination and right ascension of the sun at the present time.

12 Mention *two* variable stars and the constellation in which each is found. Give a theory to account for variable stars.

13 Define nebulae. Describe a scientific method of distinguishing nebulae from star clusters.

14 Make a diagram of the reflecting telescope, giving the names of the important parts and indicating the paths of the rays of light.

15 An observer finds that the altitude of the sun above the southern horizon as it crosses the meridian of a given place is 41°; the declination of the sun at the time of observation is 6° 34′ south. Find the latitude of the place.

High School Department

166TH EXAMINATION

PHYSICS

Wednesday, September 26, 1900—9.15 a.m. to 12.15 p.m.

Answer 10 questions but **no more**; *of these at least five must b*
part 1 in order to receive credit for part 1 and at least five from
in order to receive credit for part 2. If more than 10 are answer
the first 10 answers will be considered. Give all computations
Do not reduce metric to other measures. Each complete answer
ceive 10 credits. Papers entitled to 75 or more credits will be ac

Part 1 1 A steel girder 30 feet long, weighing 200 pounds foot, is supported on piers at the ends; a weight o pounds rests on the girder 12 feet from one end. Fi total pressure on each pier.

2 A ball rolling down an inclined plane attains at th of three seconds a velocity of 35 feet a second; find its v and the entire distance covered at the end of five second

3 Make a drawing of a section of a common force showing particularly the arrangement of valves and the for securing a constant flow. Give full explanations.

4 A piece of metal 15 centimeters long, 5 centimeter and 2 centimeters thick, weighs 1.7 kilograms; find *a*) th cific gravity of the metal, *b*) the weight of the metal in

5 Make drawings illustrating a hot water system for h a house. Show the connections of at least one radiato the direction of the current. Explain *a*) how circula produced, *b*) the location and importance of the expansio

6 Mention the ingredients of some freezing mixtu show how they are used to produce freezing. Expla principles involved.

7 Describe in detail the process of testing, without another thermometer, the correctness of a mercurial the eter as to *a*) zero point, *b*) boiling point.

8 Describe in detail an experiment to show that weight.

rt 2 9 Describe, using drawings, *a*) a one fluid cell, *b*) a two fluid cell. Mention in each case all the substances used and show the direction of the current. Mention uses for which each is specially adapted.

10 Explain the meaning of *each* of the following terms: ohm, electro-motive force, resistance, watt, ampere.

11 Describe the process of electroplating and state how it differs from the process of electrotyping.

12 What is *a*) interference of sound, *b*) reinforcement of sound? Describe and explain an experiment to illustrate.

13 Describe a method of polarizing light, state a theory to account for the phenomena exhibited and mention a purpose for which polarized light is used.

14 Describe a process for finding the focal distance of a lens or combination of lenses.

15 Describe a method by which a deaf person may compare the pitch of one tuning fork with that of another.

High School Department

167TH EXAMINATION

PHYSICS

Wednesday, January 23, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but no more; *of these 10 questions at least five must be from part 1 in order to receive credit for part 1 and at least five from part 2 in order to receive credit for part 2. If more than 10 are answered only the first 10 answers will be considered. Give all computations in full. Do not reduce metric to other measures. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Part 1

1 Define *five* of the following: acceleration, work, specific heat, momentum, center of gravity, malleability, force, energy.

2 Describe an experiment illustrating the diffusion of liquids.

3 Explain how a needle may be made to float on water and give *one* other illustration of the same principle.

4 A freely movable body is acted on by two forces, one of 20 dynes due north and one of 15 dynes due east. Find the magnitude and show by diagram the direction of the third force needed to maintain equilibrium.

5 A ball is thrown horizontally with a velocity of 50 feet a second from a point 193 feet above a level plain; find the range of the ball.

6 Define accurately the three kinds of equilibrium and give an example of each.

7 Explain by aid of a diagram *one* of the following: hydrostatic press, cause of motion in a rotary lawn sprinkler.

8 Explain by aid of a diagram the operation of *one* of the following: siphon, suction-pump.

9 A piece of brass weighs 42 kilograms in air and 37 kilograms in water; find *a*) the volume of the brass, *b*) the specific gravity of brass.

10 If the heat required to change 5 kilograms of ice at 0° C. into steam at 100° C. is applied to 70 kilograms of water at 20° C., what will be the resulting temperature of the water?

Part 2

11 Describe an experiment showing the distribution of a charge of static electricity.

12 Explain the meaning of terrestrial magnetism, and state its cause. Distinguish between isogonic lines and isoclinic lines.

13 Why are tall buildings, trees etc. specially liable to be :uck by lightning? State how a lightning-rod should be con-:ucted to protect a building most effectually.

14 Describe by aid of a diagram the construction of a tele-one receiver, and explain its operation.

15 Describe *one* of the following and explain its operation: yden jar, Bunsen photometer, siren.

16 Give a careful description of an experiment for produc-; sound beats.

7 State the law governing the velocity of sound. Compare ids, liquids and gases as media for the transmission of sound.

8 A banjo string *n* centimeters long vibrates 200 times a ond; find the number of vibrations a second of a string 2*n* itimeters long, other conditions being the same.

9 Distinguish between *a*) umbra and penumbra, *b*) real ige and virtual image. Illustrate each.

o What is chromatic aberration and how may its effects be rected?

answers will be considered. Give all computations in full. Do no... duce metric to other measures. Each complete answer will recei... credits. Papers entitled to 75 or more credits will be accepted.

Part 1 1 Define *five* of the following: osmose, erg, pneuma... calory, molar force, elasticity, dew-point, inertia.

2 Account for the elevation or depression of liquids in c... lary tubes and show the relation of the diameter of the... to the effect produced.

3 A pendulum is drawn to one extremity of its arc of os... tion and released; explain in detail the cause of the pendul... motion to the other extremity of its arc.

4 Two men, A and B, carry a weight of 112 pounds on a... between them. The men are 8 feet apart and the weight... feet from A; find what part of the weight each man bea...

5 A stone is dropped from a bridge 197.225 feet abov... water; find *a*) in what time the stone will strike the w... *b*) the final velocity of the stone.

6 Explain by the aid of a diagram the operation of *e*... the following: hydraulic ram, turbine water-wheel.

7 Describe a laboratory experiment for finding the sp... gravity of an irregular piece of cork.

8 Describe a mercurial thermometer. Give in detai... process of graduating a thermometer according to the Fa... heit scale.

9 Describe an experiment illustrating the transformat... mechanical energy into heat.

10 If 4 pounds of copper filings at 120° C. are placed...

t 2 11 Describe a laboratory experiment showing the lines of force between two bar magnets lying in the same raight line, when their opposite poles are brought near each her. Make a diagram showing the magnets and the lines of rce.

12 A metallic sphere negatively charged is brought near e end of an insulated cylindric conductor with hemispheric ds. Describe the electric effect on the cylinder.

13 State the relations between external and internal resistce under which voltaic cells will give the greatest current ength when grouped in series. Write the formula for Ohm's v as applied to this case.

14 The resistance of 390 feet of copper wire $\frac{1}{16}$ of an inch diameter is an ohm; determine the resistance of 8242 feet copper wire $\frac{1}{12}$ of an inch in diameter.

5 Describe the incandescent electric light, touching on *a*) construction of the lamp, *b*) the transformation of electric ergy into light, *c*) the grouping of the lamps.

6 Discuss sound, touching on *a*) its nature, *b*) the relation of isity and elasticity of a medium to velocity of transmission.

7 State *two* laws in accordance with which strings vibrate.

8 Find the candle-power of a lamp that, at a distance of 16 t, gives the same intensity of light as a lamp of 24 candlewer at a distance of 8 feet.

9 Define Fraunhofer's lines and explain why those of the ar spectrum are dark instead of bright.

0 Describe by the aid of a diagram the position of the lenses l the paths of the rays of light through them in *one* of the lowing: compound microscope, stereoscope.

High School Department

169TH EXAMINATION

PHYSICS

Wednesday, June 19, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more**; *of these 10 questions at least five must be from part 1 in order to receive credit for part 1 and at least five from part 2 in order to receive credit for part 2. Answer 10 questions in all cases, whether credit is desired for* **either** *one of the two parts or for both parts. If more than 10 are answered only the first 10 answers will be considered. Give all computations in full. Do not reduce metric to other measures. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

A laboratory course previously approved by the inspector, with notebook certified by the principal, may receive 20 credits toward the examination in which case only eight questions are to be answered, four from each part as above.

Part 1

1 Explain according to the molecular theory the three conditions of matter: solid, liquid, gaseous.

2 Describe a laboratory experiment illustrating diffusion of gases.

3 Determine the length of a pendulum that will oscillate 5 times in 3 seconds. [Length of second's pendulum=39.1 inches.]

4 The circumference of a wheel is 10 feet, of the axle 15 inches; determine what force acting on the wheel will balance a weight of 160 pounds applied to the axle.

5 Find in kilograms the total pressure on a cube of wood, 1 decimeter on each edge, that is immersed in water so that the upper surface of the cube is parallel to the surface of the water and 6 decimeters below it.

6 Describe a laboratory experiment for finding the specific gravity of a liquid without directly weighing a definite portion of the liquid.

7 Mention and explain *two* uses of the barometer.

8 Describe the construction and explain the operation of the air-pump. Illustrate by a diagram.

9 Mention and illustrate *two* ways by which energy in the form of heat is transmitted from one point to another.

10 Describe in detail the changes in the volume of water in passing from 15° C. to ice at 0° C.

2 11 Describe the distribution of static electricity on electrified conductors of *each* of the following forms: *a*) ıeric, *b*) cubic, *c*) spindle-shaped.

2 Describe, mentioning all the substances used, *a*) the .vity cell, *b*) the Leclanché cell. Mention the conditions of :uit under which each is specially efficient.

3 Compute the current strength of a battery of 12 voltaic ls connected in series, each cell having an electromotive ce of 3 volts, an internal resistance of 2 ohms and an ernal resistance of 30 ohms.

4 Describe a method of finding the resistance which a bar of ı offers to the transmission of electric energy.

5 Show by diagram the relations of the ordinary telegraphic ıy to the sounder. State the purpose of each.

6 Determine the length of sound waves in air at 20° C., pro- :ed by a tuning-fork vibrating 320 times a second.

7 Describe some method of determining graphically the :h of a tuning-fork.

8 An object is 3 feet from a double convex (bi-convex) lens l in the principal axis of the lens; the focal distance of the s is 1 foot. Draw a diagram showing the position of the ect, the lens, the image and the paths of the rays of light.

9 Describe an experiment illustrating interference of light reflection.

› Explain color as applied to opaque objects illuminated vhite light.

High School Department

167TH EXAMINATION

CHEMISTRY

Wednesday, January 23, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more;** *of these 10 questions at least five must be from part 1 in order to receive credit for part 1 and at least five from part 2 in order to receive credit for part 2. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

Part 1

1 State the constituents of the air and give their proportions by weight. Give *three* facts to prove that air is a mixture.

2 Describe a method of preparing oxygen, writing the reaction. Compare the physical and chemical properties of hydrogen with those of oxygen.

3 Describe the preparation of HCl, writing reactions. Mention *three* important chlorids found in nature.

4 Describe in detail the manufacture of matches.

5 Describe the preparation of potassium hydroxid and state its physical and chemical properties.

6 Describe an experiment showing that oxygen supports combustion better than air.

7 Give a description of some method of obtaining hydrogen from water.

8 Describe an experiment to show the affinity of chlorin for metals.

9 Describe a process of making nitric acid from a nitrate.

10 Describe a process of making ammonia by the action of an alkali.

Part 2

11 How may the presence of hydrogen in organic things be shown?

12 Describe the preparation, state the use and give the properties of *a*) lampblack, *b*) coke.

13 Describe the manufacture of illuminating gas.

14 Mention *two* allotropic forms of carbon, other than amorphous carbon, and give the properties and use of each.

15 Describe an experiment demonstrating the presence of CO_2 in the exhalation from the lungs.

16 Compare and explain the result of the complete combustion of kerosene with the result of its combustion when a cool porcelain dish is held in the flame.

17 Describe an experiment to show the activity of carbon at high temperatures.

18 Describe an experiment showing the action of baking-powder.

19 Show how CO_2 and alcohol can be obtained by fermentation.

20 Describe an experiment for obtaining lime-water.

High School Department

169TH EXAMINATION

CHEMISTRY

Wednesday, June 19, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more**; *of these 10 questions at least five must be from part 1 in order to receive credit for part 1 and at least five from part 2 in order to receive credit for part 2. Answer 10 questions in all cases, whether credit is desired for either one of the two parts or for both parts. If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

A laboratory course previously approved by the inspector, with notebook certified by the principal, may receive 20 credits toward the examination in which case only eight questions are to be answered, four from each part as above.

Part 1

1 Define *five* of the following: alloy, allotropism, dyad, chemism, element, reagent, occlusion.

2 A certain weight of potassium chlorate was heated till completely decomposed; if the residue weighed 149 grams, what weight of oxygen was evolved? [Atomic weight of K=39, of O=16, of Cl=35.5.]

3 Describe a method of obtaining hydrogen other than by decomposition of water, writing the reaction. Give the physical and the chemical properties of hydrogen.

4 Describe an efficient system of filtering water for a city, before introducing it into the mains.

5 Describe a method of preparing nitrogen. Give the physical and the chemical properties of nitrogen.

6 Define acid salt, normal salt, basic salt. Give an example of each.

7 Describe an experiment showing the affinity of sulfur for metals.

8 State the occurrence of iron in nature and describe the extraction of iron from *one* of the common iron ores.

9 Give the composition of gunpowder. Write the reaction that occurs when gunpowder is ignited.

10 Describe a process by which sodium carbonate is prepared from common salt.

Part 2

11 Explain the instability of organic substances.

12 Describe a method showing the presence of carbon in illuminating gas.

13 Describe the preparation, state the use and give the properties of *a*) charcoal, *b*) bone-black.

14 Explain why charring wood tends to preserve it from decay.

15 Describe the preparation of carbon monoxid. State the physical and the chemical properties of carbon monoxid.

16 Describe the structure of a candle flame and give the composition of each part.

17 Define hard water. Explain the result of combining soap and hard water.

18 Describe the preparation of phosphorus. State the physical and the chemical properties of phosphorus.

19 Describe Marsh's test for arsenic.

20 Yeast is mixed with a solution of molasses and water and kept at about 80° F.; describe the action of the yeast and mention the common name and the chemical formula of each product of such action.

High School Department

167TH EXAMINATION

GEOLOGY

Friday, January 25, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *each* of the following: carbonate, erosion, kaolin, stalagmite, monocline.

2 Mention the characteristics of mica, siderite, graphite, serpentine, pyrite.

3 Explain the formation of *each* of the following: joints, terraces, stalactites, cross-bedded structure.

4 State geologic processes involved in the life history of a river.

5 Describe glacial deposits or glacial markings that you have observed in your vicinity.

6 State the effect of oxidation on rock. Explain and illustrate.

7 Mention *three* conditions that facilitate the movement of glaciers.

8 Compare Mount Vesuvius with Mauna Loa as to *a*) form of peak, *b*) condition of the material thrown out.

9 Mention *two* ways in which lake basins have originated. Give an example of each.

10 Describe the rocks of the Permian period.

11 Give an account of the animal life of the Devonian era.

12 Describe the plant life of the Triassic and Jurassic eras.

13 Explain how Cuvier proved the existence of Tertiary mammals of extinct species.

14–15 Give an account of continental evolution as illustrated in North America.

High School Department

169TH EXAMINATION

GEOLOGY

Friday, June 21, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but no more. *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *each* of the following: moraine, fiord, fossil, drumlin, sphagnum.

2 Mention the characteristics of chalk, granite, asbestos, eimonite, dolomite.

3 Describe the origin and the structure of igneous rocks.

4 Give illustrations that you have observed of the geologic effect of frost.

5 Describe the development of an atoll.

6 What product is the result of metamorphism on *a*) sandstone, *b*) limestone, *c*) peat, *d*) clay?

7 Account for the formation of *a*) the palisades on the Hudson, *b*) the geysers of Yellowstone park.

8 Give the erosive effect of *a*) the flood tide, *b*) the ebb tide.

9 Describe the nature and the effects of geologic forces involved in the formation of an ordinary river valley.

10 State the principal cause and the effects of earthquakes.

11 Give the conditions necessary for the formation of *a*) a flood plain, *b*) a delta.

12 Describe the rocks of the Niagara period.

13 Give an account of the life of the lower Silurian era.

14 Describe the animal life of the Carboniferous era.

15 Mention evidences of the existence of prehistoric man in Europe.

High School Department

165TH EXAMINATION

PHYSICAL GEOGRAPHY

August 1900—Three hours, only

Answer 10 questions but **no more.** *If more than 10 are answered only e first 10 answers will be considered. Each complete answer will ceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *equinox*, *ecliptic*, *looming*, *anemometer*, *meteorology*.

2 Compare the earth with the planet Jupiter as to *a*) size, mass, *c*) distance from the sun.

3 Account for the difference in climate between the eastern ıd the western coasts of the southern continents.

4 Describe the periodic winds of India, giving their causes ıd their results.

5 Account for the deviation from parallels of latitude of the othermal 30°.

6 At what time of year is the temperature usually highest places having the same latitude as Havana (Cuba)? Explain.

7 Describe the polar winds of the northern hemisphere and count for their direction.

8 Give the cause of the brilliant colors often seen in the ouds at sunset.

9 Describe the development of a mountain system. State e cause.

10 Describe the relief forms of Asia and show how they ıve affected the development of that country.

11 Give reasons for regarding the drainage system of the ghland of Canada lying between the St Lawrence and Hudson .y as being in a comparatively early stage of development.

12 Why has the great low plain of Europe no large river stem? Explain.

13 Describe the course of the south equatorial current of e Pacific.

14 Explain how river courses tend to become sinuous. Give ıstrations.

15 Mention the chief physiographic reason for the location *each* of the following cities: London, Pittsburg, Carlsbad, enna, San Francisco.

High School Department

166TH EXAMINATION

PHYSICAL GEOGRAPHY

Thursday, September 27, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Construct a diagram to illustrate the change of seasons, showing the relative position of the earth and sun at the time of the solstices and of the equinoxes.

2 Mention the principal points of the nebular hypothesis.

3 Describe *two* of the following: *Mercator's projection, polar projection, equatorial projection, conical projection.*

4 Describe the drainage system of Asia, giving the location of the principal drainage center.

5 Describe the bed of the Atlantic.

6 Describe the great low plain of South America as to *a*) location and extent, *b*) nature of the soil, *c*) kind of vegetation.

7 Account for the existence of salt lakes. Give *two* examples of salt lakes.

8 Describe a Chinese typhoon as to *a*) cause, *b*) time of occurrence, *c*) kinds of motion.

9 Give the cause of mountain breezes that occur *a*) during the day, *b*) during the night.

10 Compare the climate of the Faroe islands with that of St Petersburg.

11 Describe the equatorial calms as to *a*) cause, *b*) location, *c*) extent.

12 Compare as to deviation from parallels of latitude the isothermals of the northern hemisphere with those of the southern hemisphere. Account for the difference.

13 Describe the mode of formation of coral islands. Give *two* noted examples.

14 Account for the absence of rain in the desert of Atacama in Chile.

15 Explain how the position and the physical characteristics of England have tended to promote the material prosperity of that country.

High School Department

167TH EXAMINATION

PHYSICAL GEOGRAPHY

Thursday, January 24, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: atoll, meteor, crevasse, barograph, isotherm, geyser, monsoon.

2 Describe the *two* principal motions of the earth and state their respective effects on its physical condition.

3 Mention *two* reasons why the rainfall on plateaus is less copious than that on other forms of relief.

4 Give the cause, origin and course of a West India hurricane.

5 Account for the deviation from parallels of latitude of isotherm 30° north.

6 Describe the south equatorial current of the Atlantic as to *a*) cause, *b*) course, *c*) influence on climate.

7 State in regard to spring tides *a*) the conditions under which they occur, *b*) frequency of occurrence.

8 Describe the conditions necessary for rainfall in the zone of the trades.

9 State the conditions necessary for the formation of *a*) sand bars, *b*) sounds, *c*) flood plains.

10 Describe the great low plain of Europe as to *a*) location, *b*) topography, *c*) drainage.

11 Compare the temperature of the ocean with that of the continents in *a*) winter, *b*) summer. Explain.

12 Describe the growth of a barrier reef. Mention a noted example of a barrier reef.

13 State *two* reasons why it takes a vessel less time to sail from New York to Liverpool than from Liverpool to New York.

14 Describe field study that you have made of glacial markings or glacial deposits.

15 Explain the influence of latitude on plant life. Give illustrations.

High School Department

168TH EXAMINATION

PHYSICAL GEOGRAPHY

Thursday, March 28, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: equinox, breakers, ecliptic, mirage, talus, meteorology, peat.

2 Describe the land masses of the earth as to *a*) distribution, *b*) relative size.

3 Give the cause of *a*) rainbows, *b*) coronas.

4 State the effect of the rotation of the earth on the direction of the wind in the southern hemisphere. Explain.

5 Describe an experiment to illustrate the deposit of dew.

6 Describe the stratus cloud as to *a*) cause, *b*) form, *c*) time of occurrence.

7 Show by a diagram the general direction of the constant ocean currents in the southern hemisphere.

8 State in regard to neap tides *a*) conditions under which they occur, *b*) number of times that they occur annually.

9 Describe the formation of *a*) caverns, *b*) cascades.

10 Give the conditions necessary for a periodic spring. Illustrate by a drawing.

11 What are isothermal lines? Between what isothermal lines does Europe lie?

12 Describe the gulf stream as to *a*) course, *b*) effect on climate, *c*) effect on the distribution of life.

13 Account for the absence of rain in the desert of Gobi in Mongolia.

14 Explain why the mean annual temperature of places near the western coast of Alaska is higher than that of places in corresponding latitudes on the eastern coast of North America.

15 Explain how the topography of the northern prairies of the United States has affected the development of farming implements.

High School Department

169TH EXAMINATION

PHYSICAL GEOGRAPHY

Thursday, June 20, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only he first 10 answers will be considered. Each complete answer will eceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: solstice, llano, typhoon, bore, nagnet, isobar, divide.

2 Describe the water masses of the earth as to *a*) distribu-ion, *b*) relative size.

3 Account for the formation of stratus clouds. During vhat part of the day and in what part of the sky are stratus louds most common?

4 What conditions are necessary for the production of *a*) and breezes, *b*) sea breezes?

5 Trace the course of the kuroshiwo (Japan current) and tate its effect on climate.

6 Describe the formation of *three* kinds of moraines.

7 Describe the formation of *a*) mangrove islands, *b*) sargasso seas.

8 Account for the formation of geysers. Mention *three* noted geyser regions.

9 Give with reference to the section in which you live *a*) the mean annual temperature, *b*) the mean annual rainfall.

10 Describe the development of a mountain system.

11 Describe the great low plain of North America as to *a*) location and extent, *b*) topography, *c*) drainage, *d*) adaptation to human life.

12 Compare the climate of Irkutsk, an inland town of Si-beria, with the climate of Dublin in nearly the same latitude. Explain.

13 Account for the climatic conditions in the zone of the polar winds in *a*) summer, *b*) winter.

14 Explain the influence of latitude on animal life. Give llustrations.

15 State the importance of a mountain pass. Mention sev-eral mountain passes.

High School Department

166TH EXAMINATION

BOTANY

Tuesday, September 25, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: *involucre, antheridium, stigma, deciduous, bast, stomata, epigynous.*

2 Make a drawing of an oak twig, showing the leaf arrangement. What fraction indicates the arrangement?

3 State the importance of vernation. Mention *two* kinds of vernation.

4 Suggest an experiment to illustrate the rise of sap in leaves.

5 Give the life history of a fern.

6 Compare the flower of the buttercup with that of the trillium, describing each and indicating the position of the floral parts. Use drawings to illustrate.

7 Describe the structure of dicotyledonous stems. Use drawings to illustrate.

8 Describe *two* special adaptations of flowers that facilitate the visits of insects.

9 Give the characteristics of a complete flower. Draw a complete flower, designating each part by name.

10 Describe by aid of drawings *two* specimens that you have examined with a compound microscope.

11 Account for the brilliant coloring of autumnal foliage.

12 In the arrangement of flowers and floral parts how does the rose family as illustrated by the apple differ from the soapberry family as illustrated by the horse chestnut?

13 Account for the presence of crystals often found in the cells of the higher forms of plants.

14 What causes plants to be arranged in distinct zones or areas along the shores of bodies of water? Give an example of such an arrangement.

15 Give the fundamental characteristics that assign dentaria, horse-radish and water-cress to the same family.

High School Department

167TH EXAMINATION

BOTANY

Tuesday, January 22, 1901—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered* *ıly the first 10 answers will be considered. Each complete answer will* *ɛceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: corm, perigynous, nucleus, hlorophyl, ovule, cotyledon, prothallium.

2 Describe the process of germination of Indian corn, using rawings to illustrate at least *two* stages of its early growth.

3 Make a drawing of a winter twig of the horse-chestnut, howing *a*) buds, *b*) leaf scars, *c*) lenticels.

4 Describe *two* kinds of determinate inflorescence and give an xample of each kind.

5 Compare the flower of the morning-glory with the flower ıf the nasturtium, indicating the position of the floral parts. Jse drawings to illustrate.

6 Describe *a*) each part of the pistil of a flower, *b*) each part ıf the stamen of a flower.

7 Suggest an experiment to show the tracts through which iquids rise in the stems of plants.

8 Describe by aid of a drawing the structure of a monocotyled-ɔnous stem. Give examples.

9 In kind of inflorescence and in arrangement of floral parts, ıow does wild carrot differ from toad-flax?

10 Mention *three* different shapes that the tap-root may ıssume. Make a drawing and give an example of each shape.

11 Classify fruits as to texture or consistence. Give an ex-ımple of each kind.

12 Describe the structure of the bean seed, indicating the ɾarious parts. Use drawings to illustrate.

13 Describe spirogyra as to *a*) appearance, *b*) habitat. Make ı drawing of a cell from a thread of spirogyra as seen under a ıigh power of the microscope.

14 Describe by aid of drawings *two* mounts of plant tissue, ɔther than spirogyra, that you have examined with the com-ɔound microscope.

15 From the study of the dandelion and the daisy, mention :he characteristics that you have observed which assign them :o the same family.

Or

Suggest an experiment to demonstrate longitudinal tissue ension in plants.

High School Department

169TH EXAMINATION

BOTANY

Tuesday, June 18, 1901 — 1.15 to 4.15 p. m., **only**

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

A laboratory course previously approved by the inspector, with notebook certified by the principal, may receive 20 credits toward the examination in which case only eight questions are to be answered.

1 Define *five* of the following: embryo, corolla, pith, sepal, archegonium, drupe, saprophyte.

2 Describe the structure of the pumpkin seed, indicating the various parts. Use drawings to illustrate.

3 Describe the germination of the pea, using drawings to illustrate at least *two* stages of its early growth.

4 Explain how color and odor of flowers are important in the perpetuation of species.

5 Describe the inflorescence of the oak. Make drawings of the *two* kinds of flowers of the oak.

6 Describe *four* kinds of subterranean stems. Give an example of each kind.

7 Suggest an experiment to demonstrate root-pressure in plants.

8 Describe dicotyledons as to *a*) embryo, *b*) leaf, *c*) flower, *d*) structure of wood.

9 Mention *two* characteristics of flowers that depend largely on the wind for pollination.

10 Describe the *two* kinds of flowers found on the common blue violet.

11 Draw a longitudinal section of the flower of *each* of the following, showing the arrangement of the floral parts: *a*) trillium, *b*) apple.

12 Compare the flower of the pea with the flower of the adder's-tongue as to *a*) kind of inflorescence, *b*) corolla, *c*) calyx.

13 Describe mucor (black mold) as to *a*) appearance, *b*) habitat. Make a drawing of the mycelium of mucor as seen under the compound microscope.

14 Describe, by aid of drawings, *two* mounts of plant tissue, other than mucor, that you have examined with the compound microscope.

15 Suggest an experiment to demonstrate transverse tissue tension in plants.

High School Department

167TH EXAMINATION

ZOOLOGY

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: embryo, larva, antenna, siphon, gills, ambulacrum.

2 Describe, by aid of a drawing, the structure of the hydra, indicating the various parts. Mention *two* allied forms.

3 From observations made while dissecting, describe the organs of digestion of the earthworm, indicating the various parts. Use a drawing.

4 Describe the development and the habits of the earthworm. Mention *two* allied forms.

5 Describe the circulatory system of the clam or of the mussel.

6 Give the life history of the common house-fly. Mention *two* allied forms.

7 From observations made while dissecting, describe the organs of digestion of the crayfish or of the lobster.

8 Describe the cat as to *a*) feet, *b*) eyes, *c*) teeth, *d*) habits. Mention *four* allied forms.

9 Draw and describe the mouth parts of the grasshopper.

10 Describe the fins of the perch or of some other fish as to *a*) position, *b*) structure. Use a drawing.

11 Compare the following as to method of obtaining food: amoeba, hydra, starfish, beetle.

12 Mention *two* organs of the frog and the bird that are both homologous and analogous.

13 State how *each* of the following is well adapted by structure to perform its function: proboscis (tongue) of a butterfly, gills of a mussel.

14 Describe, by aid of drawings, *two* mounts that you have examined with a compound microscope.

15 Trace the evolution of the circulatory system by describing its phases as manifested in the starfish, the grasshopper and the earthworm.

High School Department

169TH EXAMINATION

ZOOLOGY

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

A laboratory course previously approved by the inspector, with notebook certified by the principal, may receive 20 credits toward the examination in which case only eight questions are to be answered.

1 Define *five* of the following: mantle, lepidoptera, mandible, evolution, pupa, nucleus, hibernation.

2 Give the life history of a sponge. Make a diagram of a section of a sponge, showing its structure.

3 From observations made while dissecting, describe the internal organs of the starfish. Use drawings.

4 Give the life history of the grasshopper. Mention *two* allied forms.

5 From observations made while dissecting, describe the arrangement of the digestive organs of the frog. Use a drawing.

6 Draw and describe the mouth parts of a beetle.

7 What is meant by alternate generation? Illustrate.

8 From observations made while dissecting, draw and describe the digestive tract of a fish.

9 Describe the development and habits of the common garden spider. Mention *two* allied forms.

10 State how *each* of the following is well adapted by structure to perform its function: tube-feet of starfish, gizzard of chicken.

11 Describe, by aid of drawings, *two* mounts that you have examined with a compound microscope.

12 Mention the principal points, as determined by increasing complexity of structure, that assign the frog to a higher place in the scale of life than the fish; the grasshopper to a higher place than the starfish.

13 Give *two* instances in which you have observed the apparent possession of reasoning power by lower animals.

14 Describe the organs and the method of locomotion of *each* of the following: monad, crayfish, snake, clam.

15 Arrange the branches of the animal kingdom in the order of their complexity, beginning with the lowest.

High School Department

166TH EXAMINATION

PHYSIOLOGY AND HYGIENE

Wednesday, September 26, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: *oxidation, dialysis, antitoxin, mesentery, asphyxia, ptomain, astigmatism.*

2 Give the names and the location of the bones of *a*) the skull, *b*) the pelvis.

3 Mention *a*) *two* muscles of the arm, giving the function of each, *b*) *two* muscles of the leg, giving the function of each.

4 Describe the process of digestion, absorption and assimilation of fat.

5 Suggest an experiment to illustrate the digestive action of the stomach.

6 What is the normal temperature of the body? Explain the production of heat in the body.

7 From what *two* sources does the liver receive its blood supply? State the difference between the blood received from these sources.

8 State the effect on the bones of the young of *a*) use of tobacco, *b*) use of alcoholic drinks.

9 Describe the thoracic duct as to *a*) structure, *b*) location, *c*) function.

10 Describe the process of respiration of the cells of the body.

11 State the functions of the spinal cord and explain its method of action.

12 Make a drawing of a horizontal section of the eye, designating each part by name.

13 State *a*) the effect of the habitual use of alcoholic drinks on the lungs, *b*) the physiologic effect of the habitual use of opium.

14 Mention an antidote for *a*) arsenic, *b*) nitrate of silver.

15 Suggest an experiment to prove the presence of carbon dioxid in expired breath.

High School Department

167TH EXAMINATION

PHYSIOLOGY AND HYGIENE

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., **only**

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: cell, larynx, cuticle, serum, ulna, thorax, plasma.

2 Mention *five* principal kinds of tissue found in the body.

3 Describe the structure and the action of muscles.

4 Mention *four* functions of the skin and show how it is adapted by structure to perform *one* of these functions.

5 State with reference to the gastric juice *a*) its composition, *b*) its action.

6 Describe the lacteals and state their function.

7 Describe the liver and mention *two* of its functions.

8 Trace the air passages from the mouth to the air cells.

9 Give the distribution and function of *each* of the following: *a*) first pair of cranial nerves, *b*) second pair of cranial nerves.

10 State the effect of alcohol on *a*) the brain, *b*) oxygen in the blood.

11 Describe the organ of taste.

12 Give directions for the care of *a*) frost-bites, *b*) burns.

13 State the effect of the use of tobacco on *a*) the sight, *b*) the heart.

14 Describe, making use of drawings, *two* specimens that you have examined with a compound microscope.

15 State the nature of bacteria and the dangers arising from them. How does the body destroy bacteria?

High School Department

168TH EXAMINATION

PHYSIOLOGY AND HYGIENE

Wednesday, March 27, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only e first 10 answers will be considered. Each complete answer will ceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: hemoglobin, ptyalin, microbe, ıtiseptic, pleura, scapula, oxidation.

2 Describe the structure and the composition of a cell. Menɔn *three* properties of a cell.

3 Mention *two* kinds of joints in the body and show how ıch kind is well adapted by structure to do its work. Give ᴄamples.

4 Describe the salivary glands as to structure, function, ɹmber and location.

5 Give the process of the digestion, the absorption and the ssimilation of an egg.

6 Describe the appearance and composition of the bile and ate its chief function.

7 State the effect of the habitual use of tobacco on *a*) the rain, *b*) the voice.

8 Describe the structure and the location of the lymphatics ıd state their function.

9 State the difference between venous and arterial blood as *a*) appearance, *b*) composition.

10 Draw an outline of the respiratory organs showing the rynx, the trachea, the bronchial tubes and their branches. ıdicate each part.

11 Give the general anatomy of the heart. What is meant ʏ pulsation?

12 State the effect of the use of alcoholic drinks on *a*) the mperature of the body, *b*) peristaltic movement.

13 Describe the arrangement of the white and the gray atter in *a*) the brain, *b*) the spinal cord.

14 Describe, making use of drawings, *two* mounts that you ıve examined with a compound microscope.

15 What is meant by dialysis (osmosis)? Suggest an experient to illustrate dialysis.

High School Department

169TH EXAMINATION

PHYSIOLOGY AND HYGIENE

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but no more. *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: chyme, nucleus, diaphragm, ileum, tendon, systole, trypsin.

2 Give a description of the spinal column and show how its structure is adapted to protect the brain and the spinal cord.

3 State the importance of exercise. Mention *three* different kinds of exercise and discuss the peculiar benefits of each kind.

4 Give *a*) the composition of saliva, *b*) the functions of saliva.

5 Compare the digestibility of the following foods: soft-boiled eggs and hard-boiled eggs; roast pork and roast beef; boiled cabbage and raw cabbage; baked potatoes and boiled potatoes.

6 Describe the process of digestion, absorption and assimilation of starch.

7 State the effect of the use of alcoholic drinks on *a*) the respiration of the cells, *b*) the condition of the mouth.

8 Describe the structure and state the function of the capillaries.

9 Describe the movements of respiration. How does expired air differ from inspired air?

10 State the physiologic effect of the use of *a*) chloral, *b*) caffein.

11 Describe the sympathetic nervous system.

12 Give directions for the care of a person suffering from *a*) hemorrhage of the arm, *b*) an epileptic fit.

13 Describe the structure of the inner ear.

14 Describe, making use of drawings, *two* mounts that you have examined with a compound microscope.

15 Mention *a*) *two* diseases often contracted by drinking impure water, *b*) *two* methods of purifying water.

High School Department

167TH EXAMINATION

GEOGRAPHY

sday, January 24, 1901 — 1.15 to 4.15 p. m., only

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o questions but **no more.** *If more than 10 are answered only answers will be considered. Each complete answer will re- dits. Papers entitled to 75 or more credits will be accepted.*

an outline map of New York state, using one half

ie map of New York state show *a*) the Hudson river ction drained by it, *b*) the Oswego river and the sec- ed by it, *c*) the location of Syracuse, Watertown, iestown.

ibe *one* of the following: Adirondack park, Erie canal, ire of salt in New York state.

ion *two* states that bound *a*) Florida on the north, *b*) on the east, *c*) Minnesota on the west, *d*) Nebraska ith, *e*) Idaho on the west.

ion *two* leading industries of *a*) Massachusetts, *b*) inia, *c*) Louisiana, *d*) Oregon, *e*) Colorado.

ibe the climate of southern California as to *a*) tem- *b*) prevailing winds, *c*) rains. By what means has e been made successful in this section?

the locality in which *each* of the following is found nention *one* interesting fact regarding each: beaver, is, grizzly bear, moose.

ion *five* provinces included in the Dominion of Canada. the government of Canada with that of the United

has Mexico so great a variety of vegetable products? *wo* things a traveler would be likely to notice about an people.

ribe *two* of the following: selvas, pampas, native ins, Fuegians.

pare the Pacific slope of South America with the lope of South America as to *a*) extent, *b*) climate.

tion in order the waters that would be traversed by a i going from Liverpool to Hong-Kong. Mention *two* iat would probably form part of her cargo.

ribe *a*) the dikes of Holland, *b*) the canals of Holland. main purpose of each.

the location of *each* of the following and mention *one* fact concerning each: Luzon, Guam, Kimberley, n, Peking.

te an account of *one* of the following, touching on *a*) *b*) climate, *c*) chief agricultural products, *d*) kind of nt, *e*) character of people: Hawaii, Santo Domingo, **and.**

High School Department

168TH EXAMINATION

GEOGRAPHY

Thursday, March 28, 1901—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Explain why the difference in the length of day and night is greater in Labrador than in Florida. Use diagram to illustrate.

2 Give in degrees the width of the north temperate zone; explain how this width depends on the inclination of the earth's axis.

3 When it is nine o'clock standard time at Albany, what is the standard time at *a*) Chicago, *b*) San Francisco? Explain.

4 Give the location of *each* of the following and mention *one* interesting fact concerning each: Saranac lake, West Point, Brooklyn bridge, Catskill mountains, Mount Marcy.

5 Describe a trip from the place where you live to the more distant of the two places, New York or Buffalo. On what railway would you travel? About what length of time would the journey require? Mention *three* cities on the route.

6 Give in order the names of the states bordering on the Great lakes and mention by name the lake or lakes touched by each state.

7 What are the levees of the Mississippi? State the purpose of the levees and explain why they are necessary.

8 Describe *one* of the following: *a*) the production of raisins in California, *b*) the salmon industry on the Columbia, *c*) gold mining in Alaska.

9 In what country is the llama found? Mention *two* characteristics of this animal and *two* uses that are made of it.

10 Starting from the isthmus of Panama, mention in order the countries of South America that would be passed in sailing around its entire coast-line.

11 Describe the route of the proposed Nicaragua canal. Show why such a canal would be of great importance to the United States.

12 Mention an important article of export from *a*) Russia, *b*) Norway, *c*) Greece, *d*) Italy, *e*) Switzerland.

13 Give the name and location of *a*) *two* islands belonging to Denmark, *b*) *two* islands belonging to Great Britain, *c*) *one* island belonging to Holland.

14 Describe *one* of the following: *a*) the religion of Turkey, *b*) the dress of Persian women, *c*) the castes of India.

15 Mention *two* things that you would notice if you were to visit a Japanese house, that you would not see in an American house. State *two* differences between the Japanese and the Chinese.

High School Department

169TH EXAMINATION

GEOGRAPHY

Thursday, June 20, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only e first 10 answers will be considered. Each complete answer will reive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Give the location of *a*) the tropic of Cancer, *b*) the Arctic rcle. Show, by aid of a diagram, why each is located where it is.

2 Mention the *two* motions of the earth and give the princial result of each.

3 Mention *three* counties of New York state that are comaratively level, *three* that are mountainous, *three* in which natral gas is found, *one* whose waters flow into the Mississippi.

4 Give the name and the location of *one* Indian reservation in lew York state. Mention *three* characteristics of the Amerian Indian.

5 Give approximately *a*) the distance from New York to 'lattsburg, *b*) the distance from Albany to Buffalo, *c*) the area f New York state, *d*) the population of New York state, *e*) the opulation of New York city.

6 Give the name and the location of a city noted for the ıanufacture of *a*) flour, *b*) shoes, *c*) gloves, *d*) collars and cuffs,) iron and steel.

7 Mention in order the states bordering on British America.

8 Describe *one* of the following: *a*) rice-growing in Louisiana,) cotton-growing in Mississippi, *c*) coal-mining in Pennsylvania.

9 Give the location of *each* of the following and state *one* imortant fact regarding each: Denver, Santiago, Santa Fé,)uebec, Lake Nicaragua.

10 Give, with names, the location in South America of the fol›wing: *three* mountain peaks, *one* lake, *three* important rivers.

11 Mention in order the countries of Europe bordering on ıe Mediterranean sea, giving the form of government and the apital of each.

12 Give the name and the location of each of *five* of the fol›wing: *a*) a city in Great Britain noted for its ship-building, *b*) a ity in Germany noted for its manufacture of cannon, *c*) a city in taly noted for its canals, *d*) a city in Russia noted as a grain ıarket, *e*) a city on the Rhine noted for its cathedral, *f*) a city ı Greece noted for its ruins of ancient architecture, *g*) a city ı Switzerland noted for its manufacture of watches.

13 Mention a country in which the reindeer is found in large umbers. Give *two* characteristics of the reindeer and *two* ses that are made of it.

14–15 Describe *one* of the following, touching on *a*) race, *b*) ouses, *c*) dress, *d*) occupations, *e*) peculiar customs: native :awaiians, Japanese, Filipinos.

High School Department

166TH EXAMINATION

ROMAN HISTORY

Tuesday, September 25, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Draw a map of Italy and Sicily, showing, with name, the location of *a*) the Tiber, *b*) the Po, *c*) Brundisium, *d*) Mylae, *e*) Neapolis.

2 State in regard to the founding of Rome *a*) the tradition, *b*) a probable fact.

3 Define *five* of the following: *a*) *Ramnes*, *b*) *comitia centuriata*, *c*) *decemvirs*, *d*) *rex sacrorum*, *e*) *clients*, *f*) *plebeians*, *g*) *lictors*.

4 Mention the principal duties of a censor and show why this office was established.

5 Give an account of *one* of the following: *a*) the siege of Veii and its results, *b*) the Licinian laws.

6 Write on *one* of the following: *a*) the Samnite wars, *b*) the government and resources of Carthage.

7 Mention the accession to Roman territory made at the close of *a*) the first Punic war, *b*) the second Punic war. Give an account of the destruction of Corinth.

8 Write on *two* of the following: *a*) immediate and remote results of the strife between Marius and Sulla, *b*) methods by which Julius Caesar gained popularity, *c*) Julius Caesar as a statesman.

9 Show the importance of each of *three* of the following battles: Cynoscephalae, Pydna, Pharsalus, Actium, Philippi.

10 Mention *three* important events of the reign of Augustus and show the importance of each.

11 Give brief accounts of the reigns of *two* of the following: Nero, Hadrian, Marcus Aurelius.

12 Describe an important political change made by *a*) Diocletian, *b*) Constantine the Great.

13 State the leading characteristics of the Teutons. Mention an important settlement made by *a*) the Vandals, *b*) the Visigoths, *c*) the Franks.

14 Write on *two* of the following: *a*) influence of Greece on Rome, *b*) amusements of the Romans, *c*) Roman roads.

15 Write biographic notes on *five* of the following: Antiochus the Great, Belisarius, Catiline, Marcus Crassus, Lepidus, Pepin, Sallust.

High School Department

167TH EXAMINATION

ROMAN HISTORY

iday, January 21, 1901—1.15 to 4.15 p. m., only

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10 questions but **no more.** *If more than 10 are answered only*
o answers will be considered. Each complete answer will
redits. Papers entitled to 75 or more credits will be accepted.

two reasons why the location of Rome gave her *a*)
mportance, *b*) commercial advantage.

ɜ on *two* of the following: *a*) Tarquinius Priscus (the
b) reforms of Servius Tullius, *c*) expulsion of the

the conditions in Rome that caused a demand for
ıws and show what was done to satisfy the demand.

an account of the war with Pyrrhus, touching on *a*)
, *b*) the bravery displayed by the Romans, *c*) the de-
tle, *d*) the results.

ion an important duty of *each* of the following: edile,
retor, pontifex maximus, questor.

a brief account and show the result of each of *three*
lowing events connected with the second Punic war:
ge of Saguntum, *b*) the appointment of Fabius Maxi-
ctator, *c*) the fall of Syracuse, *d*) the siege of Capua.

ribe the changes in Roman society that resulted from
ınquests. Mention *two* laws favoring the lower classes
passed by the influence of the Gracchi.

an account of *two* of the following: *a*) the invasion
nbri and Teutones, *b*) the war with the pirates, *c*) the
of transalpine Gaul.

ain the nature of the triumvirates. State in regard
st triumvirate *a*) names of its members, *b*) political
of each member, *c*) plans.

ɜ a synopsis of the important events of Roman history
assassination of Julius Caesar to the establishment of
e under Augustus.

w by map or otherwise the extent of the Roman em-
e time of Augustus.

ɜ an account of the reign of Nero and explain the dis-
ıt followed his death.

te on *two* of the following: *a*) removal of the capital
y, *b*) reign of Julian, *c*) origin of the Frankish king-
levelopment of slavery into serfdom.

ɜ an account of Justinian as *a*) a conqueror, *b*) a states-
builder.

e biographic notes on *five* of the following: Arminius,
les, Ennius, Livy, Mithradates, Theodoric, Vercinget-
›bia.

High School Department

169TH EXAMINATION

ROMAN HISTORY

Monday, June 17, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Draw a map of Italy and on it show *a*) the approximate boundaries of Latium, *b*) the names of the races or tribes whose territories bounded Latium.

2 Write on *two* of the following: *a*) the Sibylline books, *b*) the sacred colleges, *c*) Rome's indebtedness to the Etruscans.

3 State what led to the first appointment of each of *two* of the following: *a*) dictator, *b*) censor, *c*) pretor.

4 Explain *five* important rights of Roman citizenship.

Or

Summarize the leading events of the first Punic war.

5 Compare the strength of Rome with that of Carthage at the beginning of the first Punic war, touching on the following: *a*) wealth, *b*) naval power, *c*) military power, *d*) national unity.

6 Write on *two* of the following: *a*) destruction of Carthage (146 B. C.), *b*) first servile war, *c*) political parties that resulted from changes made by foreign conquests.

7 Give an account of *one* of the following: *a*) changes made by Sulla in the Roman constitution, *b*) disorders in the republic that followed soon after the death of Sulla.

8 Give an account of the life of Cicero, touching on *a*) parentage, *b*) education, *c*) legal victories, *d*) consulship, *e*) manner of death.

9 Give an account of the breaking up of the first triumvirate and state the immediate results.

10 How did the establishment of the empire affect *two* of the following: *a*) provincial government, *b*) commerce, *c*) literature *d*) government of the city of Rome?

11 Connect *each* of the following with the reign in which it occurred: *a*) defeat of Varus, *b*) destruction of Pompeii, *c*) composition of the *Aeneid*, *d*) first persecution of Christians, *e*) real conquest of Britain.

12 State *two* reasons for the transfer of the capital to Constantinople. Describe a marked change in the method of government made by Diocletian and retained by Constantine the Great.

13 Mention *three* barbarian invasions of Italy that occurred in the fifth century and give an account of *one* of them.

14 Summarize the events subsequent to the battle of Tours that led to the establishment of Charlemagne's empire.

15 Write biographic notes on *five* of the following: Ambrose of Milan, Belisarius, Clovis, Chosroes 2 (Khusrau), the emperor Julian, Omar, Stilicho, Valentinian 1.

High School Department

167TH EXAMINATION

MEDIEVAL HISTORY

Friday, January 25, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Mention *two* of the features that distinguish the middle ges from *a*) ancient times, *b*) modern times.

2 State, in regard to the migration of Teutonic tribes in the urth and fifth centuries, *a*) principal causes, *b*) effects on the oman empire, *c*) effect on the spread of Christianity.

3 State the circumstances that led to the original settlement Teutonic tribes in Britain. Show briefly how national rowth was aided by *a*) the council of Whitby, *b*) the reign of gbert, *c*) the reign of Alfred.

4 Give an account of the danger that threatened the eastern npire in the reign of *a*) Justinian, *b*) Heraclius. Show the importance to western Europe of the preservation of the eastern npire.

5 Show how the Moors *a*) obtained Spain, *b*) contributed to uropean progress, *c*) lost their kingdom.

6 Indicate by map or otherwise the extent of Charlemagne's npire and describe the methods by which he retained control it.

7 Give an account of *a*) the Teutonic custom which was ne of the origins of feudalism, *b*) conditions that favored the rowth of feudalism.

8 Give an account of the Danish conquest of England, vering *a*) causes, *b*) results.

9 State *a*) the origin of the Normans, *b*) the claims of William 1 to the English throne, *c*) *three* results of the Norman onquest of England.

10 Show the influence of the crusades on *a*) feudalism, *b*) poplar government, *c*) the establishment of strong monarchies.

11 Give an account of the struggle between Philip the Fair nd Pope Boniface, covering *a*) causes, *b*) *two* important results.

12 Show the connection between the capture of Constantiople by the Ottoman Turks and *a*) the revival of learning, *b*) e great maritime discoveries of the 15th century.

13 State in regard to the hundred years war *a*) causes, *b*) prinpal battles, *c*) results to England, *d*) results to France.

14 Write on *two* of the following: *a*) Italian free cities, *b*) e Hanseatic league, *c*) Edward 1 of England as a statesman.

15 Write biographic notes on *five* of the following: Abelard, e Venerable Bede, Erasmus, Froissart, Thomas a Kempis, arco Polo, Tamerlane, Sir William Wallace.

High School Department

169TH EXAMINATION

MEDIEVAL HISTORY

Friday, June 21, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answere the first 10 answers will be considered. Each complete answer receive 10 credits. Papers entitled to 75 or more credits will be acc*

1 Sketch briefly the career of Alaric. How was the sa Rome (410 A. D.) regarded by *a*) the pagans, *b*) the Christ

2 Show, by map or otherwise, the location of a kin founded by *a*) the Vandals, *b*) the Visigoths, *c*) the Ostrog *d*) the Burgundians, *e*) the Franks.

3 Give an account of the Celtic church, covering *a*) o *b*) missionary zeal, *c*) educational services, *d*) absorptio the Roman church.

4 Give an account of *two* of the following: *a*) the end western empire (476 A. D.), *b*) the founding of Venice, accession and rule of Theodoric.

5 State the important result of *each* of the following ba *a*) Soissons, *b*) Châlons, *c*) Tours, *d*) Roncesvalles, *e*) Has

6 State *three* important doctrines of Mohammedanism.

7 Explain in regard to chivalry *a*) its virtues, *b*) its d *c*) the principal cause of its decay.

8 Show the influence of the crusades on *a*) the chur commerce, *c*) the intellectual advancement of Europe, preservation of the eastern empire.

9 Compare the Saxon and the Norman invasions of En as regards the effect of *each* on *a*) religion, *b*) educati laws, *d*) language, *e*) architecture.

10 Mention *three* important events o. the reign of He of England and show the importance of each.

11 Write on *two* of the following connected with the tagenet period: *a*) development of constitutional govern *b*) rise of English literature, *c*) industrial changes in En

12 Give an account of the invention of printing and de its introduction into *a*) England, *b*) France.

Or

Show why, before the invention of printing, national g ment was necessarily in the hands of a few.

13 Write on *two* of the following: *a*) the kingdom of gary and its importance to western Europe, *b*) the conqu the Ottoman Turks, *c*) the preaching of Savonarola.

14 Explain or define *three* of the following: fief, feuda iconoclasts, interdict, Salic law, simony. Distinguish b Aryan and Arian.

15 Write biographic notes on *five* of the following: Cervantes, Godfrey de Bouillon, Sir John Mandevil copius, St Augustine, Tribonian.

High School Department

166TH EXAMINATION

ENGLISH HISTORY

Thursday, September 27, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Mention *two* sources of information in regard to the early Britons. Describe the colonization of Britain by the Romans.

2 Draw a map of England and Wales and on it indicate approximately the location of *a*) East Anglia, *b*) Essex, *c*) Kent, *d*) Sussex, *e*) Wessex.

3 Give an account of *two* of the following: *a*) council of Whitby, *b*) reforms of Dunstan, *c*) village life among the Saxons.

4 Write on *two* of the following: *a*) Norman castles, *b*) classes of society under Norman rule, *c*) effects of the Norman conquest on the commerce and on the intellectual life of England.

5 Connect an important event with the reign of *a*) Henry 1, *b*) Stephen, *c*) Henry 2, *d*) Richard 1, *e*) John.

6 Give an account of the origin of De Montfort's parliament. Mention an important difference between De Montfort's parliament and the model parliament of Edward 1.

7 Relate the circumstances that *a*) led to the deposition of Richard 2, *b*) caused the rivalry between the houses of Lancaster and York.

8 Show the effect on parliamentary power of *a*) the accession of the Lancastrians, *b*) the wars of the roses.

9 Write on *two* of the following: *a*) domestic and foreign policy of Henry 7, *b*) divorce of Catharine of Aragon and its results, *c*) voyages of exploration in the Tudor period.

10 Mention and explain *two* important acts of the long parliament.

11 State important gains that came to England as a result of *a*) the war of the Spanish succession, *b*) the seven years war.

12 Show the truth of the following: "The revolution of 1688 had transferred power from the crown to the aristocracy. The reform act of 1832 transferred power from the aristocracy to the middle class."

13 Write on *two* of the following: *a*) Eastern question, *b*) Berlin treaty, *c*) importance and control of the Suez canal.

14 Define *each* of the following and state Gladstone's attitude toward each: *a*) Irish home rule, *b*) compulsory church rates, *c*) extension of the franchise.

15 Write biographic notes on *five* of the following: Thomas Becket, Lady Jane Grey, Sir Rowland Hill, Mary Queen of Scots, Charles Reade, Cecil Rhodes, Sir Garnet Wolseley.

Edinburgh, *e*) York.

2 Give an account of the early Britons, touching on *a*) acteristics, *b*) mode of life.

3 Describe *a*) the traces of Roman occupation left on E soil, *b*) the sufferings of the Britons on the withdrawal Roman troops.

4 Define or explain *five* of the following: compurg Danegeld, folkland, gild, hundred, reeve, shire-moot, t viking, witenagemot.

5 Show how Henry 1 *a*) obtained the throne, *b*) gained mandy, *c*) won the favor of the English.

6 State *three* important provisions of magna charta and tion the classes of people protected by it.

7 Mention an event that connected the history of Sco with that of England in the reign of *a*) William 1, *b*) Edw *c*) Edward 2, *d*) James 1, *e*) Anne.

8 Write on *two* of the following: *a*) decline of ser *b*) increase of wages in the 14th century, *c*) reforms of W *d*) services of Chaucer and Langland.

9 State the circumstances that led Philip 2 of Spain to at the invasion of England. Mention facts showing *two* m characteristics of Elizabeth's reign.

10 Give an account of the life of Oliver Cromwell. Sh an incident *one* prominent trait of Cromwell's character.

11 Give an account of the dealings of Louis 14 of F with *a*) Charles 2, *b*) James 2, *c*) the Old Pretender.

12 Mention *a*) *five* important territorial gains made by land since 1700, *b*) *two* English colonies that are largel governing.

13 Write on *two* of the following: *a*) industrial prog the reign of George 3, *b*) treatment of criminals and d in the 18th century, *c*) Napoleonic wars.

High School Department

168TH EXAMINATION

ENGLISH HISTORY

Thursday, March 28, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Mention a geographic fact to account for the greatness of England in *a*) commerce, *b*) manufactures. How has the insular position of England affected her political development?

2 State *five* historical facts relating to the Roman conquest and occupation of Britain.

3 State the circumstances under which the following was written: "The barbarians drive us to the sea, the sea drives us back to the barbarians."

4 Show what was done by Alfred *a*) to aid education, *b*) to improve the laws.

5 Write on *two* of the following topics relating to William 1: *a*) claims to the English throne, *b*) methods used to establish a strong government, *c*) characteristics as shown by his deeds.

6 Give an account of Ireland, touching on *a*) its earliest known inhabitants, *b*) its influence on early English history, *c*) its first conquest by an English king and the results.

7 Write on *two* of the following connected with the reign of Edward 1: *a*) confirmation of the charters, *b*) expulsion of the Jews, *c*) statute of Winchester.

8 State the approximate duration of the Tudor period. Mention *three* events of the Tudor period that indicate an increase of royal power.

9 Sketch the life of Mary Tudor, covering *a*) parentage, *b*) marriage and its results, *c*) religious enthusiasm, *d*) disappointments.

10 What circumstances promoted American colonization *a*) in the reign of James 1, *b*) in the reign of Charles 1, *c*) under the commonwealth?

11 Describe *two* methods, regarded as illegal, that were employed by Charles 1 to raise revenue. Give for each method a reason for regarding it illegal.

12 Mention *three* important events of the reign of Queen Anne and give an account of *one* of them.

13 Write on *two* of the following: *a*) the services of William Pitt (Earl of Chatham), *b*) the ambition of George 3 and its results, *c*) the Peninsular war.

14 Give an account of *two* of the following: *a*) causes of the chartist uprising, *b*) demands of the chartists, *c*) seizure of the Transvaal (1877), *d*) Irish land league.

15 Write biographic notes on *five* of the following: Sir Richard Arkwright, Robert Burns, John Colet, Margaret of Anjou, Admiral Rodney, Sir Anthony Vandyke, William 2.

High School Department

169TH EXAMINATION

ENGLISH HISTORY

Thursday, June 20, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but no more. *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Show, by map or otherwise, what portions of England are generally best adapted to *a*) agriculture, *b*) mining and manufacturing. Give the location, with name, of each of *two* important manufacturing cities of England.

2 Describe the industrial and religious changes in Britain that resulted from the Roman conquest.

3 Write on *two* of the following: *a*) *two* characteristics of the Saxon invaders as shown in the treatment of Anderida, *b*) literary productions of the Saxon period, *c*) Saxon methods of trying criminals.

4 Mention a gain for popular government made in the reign of *a*) Henry 1, *b*) Richard 1, *c*) John, *d*) Henry 3, *e*) Edward 1.

5 Mention *two* Plantagenet kings who were deposed and state the circumstances that led to the deposition of *one* of them.

6 Give an account of *two* of the following: *a*) career and fate of Joan of Arc, *b*) services of William Caxton, *c*) battle of Bosworth Field and its results.

7 Give an account of the means employed by Henry 7 to *a*) fill his treasury, *b*) maintain peace.

8 Describe the customs of Elizabeth's reign regarding *a*) travel, *b*) amusements. Mention *two* events of Elizabeth's reign that indicate the commercial enterprise of the English.

9 State in regard to the Scottish covenant (1638) *a*) cause, *b*) purpose, *c*) effects on political events in England.

10 Explain *three* limitations of royal power that were made in the reign of William and Mary.

11 Write on *two* of the following: *a*) literary productions of Anne's reign, *b*) conquest of India, *c*) results of the introduction of steam-power.

12 Give an account of the condition of the Irish agricultural classes prior to 1870, covering *a*) ownership of the farm lands, *b*) nature of the farm leases, *c*) injustice frequently shown to tenants.

13 Write in detail on *one* of the following: *a*) foreign policy of Benjamin Disraeli and its results, *b*) colonial growth in Victoria's reign.

14 Define or explain *five* of the following: benefit of clergy, chartist, corn laws, ordeal, scutage, serf, sepoy, ship-money.

15 Write biographic notes on *five* of the following: Agricola, John Bright, Captain James Cook, Sir Martin Frobisher, John Howard, John Milton, Sir Henry Vane.

High School Department

166TH EXAMINATION

ELEMENTARY UNITED STATES HISTORY AND CIVICS

'ednesday, September 26, 1900—9.15 a.m. to 12.15 p.m., only

Answer 10 questions but **no more.** *If more than 10 are answered ly the first 10 answers will be considered. Each complete answer will ceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 State *a*) *two* motives that led early explorers to visit the :w world, *b*) *two* results of early explorations.

2 Connect an important event with *each* of the following: ɪhn Cabot, Cortez, La Salle, Magellan, Ponce de Leon.

3 Describe the personal appearance and the mode of life of e North American Indians. Mention the principal tribes of ıdians that inhabited New York.

4 Give an account of the settlement of each of *two* of the llowing: *a*) Georgia, *b*) Maryland, *c*) Rhode Island.

5 What were the leading industries in colonial times in *a*) ew England, *b*) New York, *c*) Virginia?

6 State *a*) *two* causes of dispute between the English and e French colonists in North America, *b*) *one* advantage gained · the English colonists from the intercolonial wars.

7 Explain *two* of the following: *a*) navigation acts, *b*) stamp t, *c*) declaratory act, *d*) mutiny act.

8 Mention the battle of the revolution that gave the British ssession of *a*) New York city, *b*) Philadelphia. Describe *one* the battles mentioned.

9 Write on *two* of the following connected with Washington's .ministrations: *a*) first inauguration, *b*) an important finan-ıl measure, *c*) admission of new states.

10 Give an account of *one* of the following: *a*) industrial anges caused by the war of 1812, *b*) the completion and im-ɪrtance of the Erie canal.

11 State immediate and remote results of the annexation of :xas.

12 Give an account of *two* of the following: *a*) services of :w York state in the civil war, *b*) draft riots, *c*) Atlantic cable.

13 Write biographic notes on *five* of the following: Sir lmund Andros, James Fenimore Cooper, John Jay, Pontiac, illiam H. Seward, William T. Sherman, David Wilmot.

14 State the principal provisions of the treaty between the ıited States and Spain (1898). Who has power to make trea-:s for the United States?

15 Classify the following acts as *a*) legislative, *b*) executive, judicial: alien and sedition laws, admission of Missouri, ecie circular, fugitive slave law, Dred Scott decision, emanci-tion proclamation.

High School Department

167TH EXAMINATION

ELEMENTARY UNITED STATES HISTORY AND CIVICS

Wednesday, January 23, 1901 — 9.15 a. m. to 12.15 p. m., only

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Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Connect an important fact of American history with each of *five* of the following: Amerigo Vespucci, Sir Francis Drake, Sir Walter Raleigh, John Smith, Miles Standish, Peter Minuit, Roger Williams.

2 Define *or* explain, with reference to Indian life, *five* of the following: *a*) wigwam, *b*) scalp-lock, *c*) wampum, *d*) totem, *e*) moccasin, *f*) death-song, *g*) running the gantlet.

3 Mention the European nations that claimed territory in New York. Explain the consequences of Champlain's attacks on the Iroquois.

4 Give an account of the Plymouth settlement, covering *a*) purpose of the settlers in coming to America, *b*) kind of government established, *c*) hardships endured.

5 State the purpose and an important result of each of *two* of the following: *a*) stamp act congress, *b*) committees of correspondence, *c*) declaration of independence.

6 Mention *two* important battles of the revolution that were fought in New York state and give an account of *one* of them.

7 Give the names of the 13 original states.

8 Describe by map or otherwise the northwest territory, showing the states that have been formed from it.

9 Write on *one* of the following: *a*) Jay's treaty with England and its results, *b*) invasions of New York state in the war of 1812.

10 Describe *two* routes of travel from the Atlantic states westward that were much used before railways were built.

11 Mention *three* events that indicated ill feeling in regard to slavery before the civil war. Give an account of *one* of the events mentioned.

12 Show the importance in the civil war of *two* of the following: *a*) defeat of the Merrimac, *b*) battle of Antietam, *c*) capture of Vicksburg.

13 Write on *two* of the following: *a*) assassination of Garfield, *b*) resources of Alaska, *c*) annexation of the Hawaiian islands.

14 Mention *a*) the departments of government that were established by the constitution, *b*) *two* duties of the president of the United States.

15 State briefly how a United States law is made.

High School Department

168TH EXAMINATION

ELEMENTARY UNITED STATES HISTORY AND CIVICS

Vednesday, March 27, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only e first 10 answers will be considered. Each complete answer will ceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Write on *two* of the following: *a*) origin of the name merica, *b*) England's claim to North America, *c*) the discovery the Pacific.

2 Mention *three* traits of character and *two* religious beliefs the North American Indians.

3 What portions of New York state were first settled by the utch? State the approximate location of a settlement made New York by the Germans.

4 Give an account of the settlement of Maryland, touching ı *a*) name and purpose of its founder, *b*) the toleration act, Clayborne's rebellion.

5 Describe the trade of the American colonies prior to the volution, including a mention of *three* important articles *a*) ported, *b*) imported.

6 State the circumstances that led to *a*) the battle of Prince-n, *b*) Sullivan's expedition (1779).

7 Mention *two* important events that occurred in Jefferson's lministration and give an account of *one* of them.

8 State in regard to travel in the United States *a*) means sed by early settlers, *b*) an improvement made before 1800, *two* improvements introduced between 1800 and 1850.

9 Write on *one* of the following: *a*) the antislavery leaders New York, *b*) the discovery of gold in California and the sults of the discovery.

10 Write brief biographies of *two* of the following: Lafa-ette, Andrew Jackson, Cyrus W. Field.

11 Mention *two* remote causes and *two* immediate causes of e civil war.

12 Define impeachment. By whom are impeachments *a*) ade, *b*) tried? What president of the United States was tried ı impeachment charges?

13 Give an account of *two* of the following: *a*) the Alabama aims, *b*) the Ku-Klux Klan, *c*) Greater New York, *d*) the ırt taken by New York in the Spanish war.

14 Connect an important event in American history with ch of *five* of the following places: Kingston, Newburgh, swego, Palmyra, Plattsburg, Tappan, Ticonderoga, Tarry-wn, White Plains.

15 How are members of the cabinet chosen? Mention the ficial titles and general duties of *three* cabinet officers.

High School Department

169TH EXAMINATION

ELEMENTARY UNITED STATES HISTORY AND CIVICS

Wednesday, June 19, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Describe *two* trade routes between Europe and Asia in the 15th century and show why other routes were sought.

2 What portions of New York were inhabited by Algonquins? Show the attitude of the Algonquins in New York and New Jersey toward *a*) the Iroquois, *b*) the early Dutch settlers.

3 Describe Raleigh's attempts to settle Virginia and state *a*) the immediate results, *b*) a remote result.

4 Write on *one* of the following: *a*) effects of the French and Indian wars on the colonies, *b*) important events in Governor Dongan's administration.

5 Mention *two* colonial congresses that met prior to 1775 and state what was done by each.

6 Give an account of the sufferings of New York in the revolution, covering *a*) battles fought in the state, *b*) hostile invasions, *c*) duration of the British occupation of New York city and vicinity.

7 Mention and explain *two* difficulties encountered by the government of the United States from 1783 to 1789.

8 Show the effect on the growth of slavery of *a*) the cultivation of tobacco, *b*) the ordinance of 1787, *c*) the growing of cotton.

9 Write on *one* of the following: *a*) the battle of Lake Champlain (1814), *b*) the anti-rent troubles, *c*) the origin of the free-soil party.

10 Give a brief account of the territorial gains made by the United States between 1812 and 1870.

11 Mention *three* important naval engagements in the civil war and state a result of each.

12 Give an account of *one* of the following: *a*) the Pacific railways, *b*) the battle of Manila bay, *c*) the formation of Greater New York.

13 Write biographic notes on *five* of the following: George Rogers Clark, De Witt Clinton, George Armstrong Custer, James Buchanan Eads, Robert Fulton, Alexander Hamilton, Elias Howe, George Gordon Meade.

14 Define or explain *five* of the following: census, copyright, counterfeiting, patent, privateer, treason, treaty, veto.

15 State in regard to the justices of the supreme court of the United States *a*) method of appointment, *b*) term of office. Who was the first chief justice?

High School Department

166TH EXAMINATION

ADVANCED UNITED STATES HISTORY

'hursday, September 27, 1900—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only le first 10 answers will be considered. Each complete answer will eceive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Compare the topography of New England with that of 'irginia. Show how topography has affected the industries nd political organization of each section.

2 Describe the explorations of *two* of the following: Leif ricson, Verrazani, De Soto. State effects of the discovery of merica on the history of Europe.

3 Give an account of the formation of the Connecticut colony, overing *a*) migrations of 1636 and their cause, *b*) adoption of constitution, *c*) accession of New Haven, *d*) royal charter.

4 Write on the early history of New York, touching on *a*) rst settlements and their purpose, *b*) territorial boundaries f New Netherlands, *c*) weakness and downfall of the Dutch overnment.

5 Draw a map of New York state and on it show, with names, ie location of *three* French forts. Explain the strategic importance of *each* of the forts located on the map.

6 Discuss the following, showing in what respect it is *a*) orrect, *b*) incorrect: "Europe, and not England, is the parent ountry of America."

7 Give an account of the services of Alexander Hamilton, overing *a*) military career, *b*) attitude toward the tories after ie war, *c*) financial measures for restoring credit to the government under the constitution.

8 Explain, with reference to the constitution, *two* of the llowing: *a*) checks and balances, *b*) bill of rights, *c*) method ratification, *d*) methods of amendment.

9 What were the leading principles of the early federalist irty? State the effect on the fortunes of the federalists of X. Y. Z. letters, *b*) the alien and sedition laws.

10 Relate the circumstances that led to the adoption of the 12th amendment to the constitution. State substantial changes made by the 12th amendment.

11 Show the importance to the United States in the war of 1812 of Perry's victory on Lake Erie and the recovery of Detroit. State the purpose of the British in *a*) the invasion of New York *via* Plattsburg, *b*) the attack on New Orleans.

12 Give an account of *three* financial measures connected with Jackson's second administration.

13 Compare the northern and the southern states at the beginning of the civil war as regards *a*) population, *b*) wealth, *c*) diversity of industries. State *two* domestic difficulties and *one* international dispute that resulted from the civil war.

14 Describe the political conditions during Grant's administrations that called for reform in *a*) the United States, *b*) New York state. Sketch the life of *one* of the following: Horace Greeley, Samuel J. Tilden.

15 State, in regard to the Philippines, *a*) why they were seized by the United States, *b*) why they were retained. Give arguments for *or* against retaining the Philippines as a permanent possession.

High School Department

167TH EXAMINATION

ADVANCED UNITED STATES HISTORY

Thursday, January 24, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Explain how each of *three* of the following has affected the settlement or the development of the United States: *a*) water-power of New England, *b*) coast-line of New England, *c*) position of the Appalachian mountains with reference to the coast, *d*) diversity of soil and climate.

2 Give an account of the explorations of the Cabots, covering *a*) motives of the explorers, *b*) route chosen, *c*) discovery made, *d*) immediate and remote results.

3 Mention *three* colonies that at the time of their settlement granted a large degree of religious toleration, and show in each case the origin of this toleration.

4 Trace the growth of representative government in New York, describing *a*) the council of 12 (Kieft), *b*) the council of nine (Stuyvesant), *c*) the Dongan charter, *d*) the powers of the colonial assembly.

5 Show by map or otherwise the territory in North America claimed by France at the beginning of the 18th century. Summarize the events (1757–1763) by which France lost control of American possessions.

6 Colonel Barré said in the house of commons concerning the American colonies: "They planted by your care! No: *your oppressions planted them in America* . . . They nourished up by your indulgence! *They grew by your neglect of them* . . . They protected by your arms! *They have nobly taken up arms in your defense.*" Mention *three* facts that substantiate the above italicized statements.

7 Give an account of the articles of confederation, covering *a*) origin, *b*) adoption, *c*) provisions in regard to number and vote of delegates, *d*) provision in regard to amendments.

8 Describe the condition of New York state at the close of the revolution as regards *a*) territory settled, *b*) principal cities, *c*) rank among sister states, *d*) government.

9 Mention *three* important safeguards guaranteed in the first 10 amendments to the constitution. State when and why the first 10 amendments were adopted.

10 Write biographic notes on *five* citizens of New York state who became prominent in national politics prior to the civil war.

11 Show how the settlement of the west has been aided by *a*) *two* acts of congress, *b*) *two* inventions. Mention *two* political writings of the 18th century that largely influenced the history of the United States.

12 Mention an event or an utterance unfavorable to the perpetuity of the Union that resulted from *each* of the following: *a*) alien and sedition laws, *b*) war of 1812, *c*) tariff of abominations (1828), *d*) Kansas-Nebraska act, *e*) Dred Scott decision.

13 Show by map or otherwise the slave states that *a*) seceded prior to Lincoln's inauguration, *b*) seceded after Lincoln's inauguration, *c*) did not secede. How was slavery abolished in the slave states that did not secede?

14 In 1790 about 3% of the population of the United States lived in cities; in 1890 nearly 30%. What industrial changes have favored this increase of city population?

15 Give an account of *three* of the following: *a*) carpet-bag government, *b*) presidential succession act, *c*) anti-contract labor law, *d*) interstate commerce commission.

High School Department

169TH EXAMINATION

꜀DVANCED UNITED STATES HISTORY

ɹrsday, June 20, 1901—9.15 a. m. to 12.15 p. m., only

'er 10 questions but **no more.** *If more than 10 are answered only t 10 answers will be considered. Each complete answer will 10 credits. Papers entitled to 75 or more credits will be accepted.*

ıow how *each* of the following affected the exploration ement of North America: *a*) the Newfoundland fisheries, defeat of the Spanish armada, *c*) Sir Walter Raleigh's royal favor, *d*) the commercial rivalry of European s.

ıow, by citing facts, *three* reasons why the early colonists th America found it difficult to make permanent settle- Mention *two* particulars in which the settlers received le assistance from the natives.

ve an account of the Iroquois of New York, covering *a*) ment, *b*) progress toward civilization, *c*) part in the tion, *d*) treatment received after the revolution, *e*) t status.

ow how the colonists of New England generally differed ɔose of Virginia in religious sympathies. How was im- ion to New England or to Virginia affected by *a*) the us intolerance of James 1, *b*) the political disorders of gn of Charles 1, *c*) the establishment of the common- , *d*) the accession of Charles 2?

rite on *two* of the following: *a*) the finances of the rev- ., *b*) the Newburgh addresses, *c*) the ownership of North ca as fixed by the treaty of peace, 1783.

ate the conditions existing in the United States between ıd 1789 that show the wisdom of the following prohibitions constitution:

state shall . . . coin money; emit bills of credit; ınything but gold and silver coin a tender in payment ts."

state shall, without the consent of the congress, lay ıposts or duties on imports or exports . . ."

ve an account of the Northwest territory, showing *a*) by Europeans it was first explored and claimed, *b*) how it ected by the parliamentary legislation of 1774, *c*) how it ɔn for the United States.

8 State the financial argument that was advanced by the anti-federalists of New York against the adoption of the federal constitution, and show at what subsequent time and with what result this argument was revived.

9 Mention facts relating to the latter part of the 18th century that show progress of thought in the United States in regard to *a*) slavery, *b*) extension of the franchise, *c*) religious liberty, *d*) primogeniture.

10 Jefferson predicted that it would be a thousand years before the country would be thickly settled as far west as the Mississippi. What conditions existing at the beginning of the 19th century might seem to justify such a prediction?

11 Show how *each* of the following affected the fortunes of a prominent political party: *a*) alien and sedition laws, *b*) Hartford convention, *c*) election of John Quincy Adams, *d*) panic of 1837, *e*) Kansas-Nebraska act.

12 Show, by map or otherwise, what states west of the Mississippi had been admitted to the Union prior to 1860 as *a*) slave states, *b*) free states.

13 Write on *two* of the following: *a*) services of John Ericsson, *b*) disorders of the reconstruction period, *c*) political leaders of New York state during the civil war, *d*) abolition of school rate bills in New York state.

14 Write on *two* of the following: *a*) the questions definitely settled by the civil war, *b*) the services of the weather bureau, *c*) the Hawaiian republic and its annexation to the United States, *d*) the relations of the United States to Cuba.

15 In 1830 a quarter of an acre of land near the mouth of the Chicago river was worth $20, in 1894 the same land was estimated to be worth $1,250,000; account for this rapid increase in value. Give argument for or against the proposition that the community rather than the individual should profit by the increase of land values.

Note to the student.

Kindly answer the following for the benefit of the examiner:

a Have you studied *intensively* the history of New York state or any given period of United States history?

b Have you kept a notebook?

c What books have you read in connection with your study of advanced United States history?

High School Department

166TH EXAMINATION

CIVICS

Thursday, September 27, 1900—1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following terms: *caucus*, *taxes*, *mortgage*, *slander*, *bribery*, *treaty*, *requisition*.

2 State the advantages to a people of government under a written constitution. Illustrate by reference to the government of the United States.

3 Explain why the problems of local government are more difficult in a large city than in a village.

4 Mention *three* natural rights of man and state *two* ways in which these rights are limited.

The following *five* questions refer to New York state:

5 Distinguish between the duties of a grand jury and those of a petit jury. Describe the process of finding an indictment.

6 Describe the blanket (Australian) ballot. What are the essential advantages of its use?

7 Give, with reference to each of *two* of the following, *a*) mode of election, *b*) length of term, *c*) manner of compensation, *d*) *two* duties: school district collector, town clerk, county clerk.

8 Mention the provision of the constitution in reference to the state legislature as to *a*) freedom of debate, *b*) printing of bills. Give a reason for each of these provisions.

9 Give the manner of obtaining office, the length of term and the chief duty of *each* of the following: lieutenant-governor, superintendent of prisons, judge of the court of appeals.

The following questions refer to the United States:

10 State wherein the articles of confederation were defective and show how the constitution remedied these defects.

11 Mention the successive steps in the process of nominating and electing a candidate for the presidency.

12 State the substance of the constitutional provision regarding search-warrants and explain the importance of this provision.

13 Give the constitutional qualifications of the following officers: vice-president, member of the house of representatives, United States senator.

14 Mention *three* important prohibitions imposed on congress by the constitution.

15 Give arguments for or against the election of United States senators by popular vote.

High School Department

167TH EXAMINATION

CIVICS

Thursday, January 24, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following terms: treason, tariff, deed, consul, copyright, extradition, bribery.

2 Explain the advantages of the government of the United States over *one* other common form of government.

3 Give the substance of a provision of the United States constitution that insures *a*) personal liberty, *b*) protection to private property.

4 What is a will? What formalities as to signature and witnesses are necessary to give validity to a will? Mention *two* ways in which a will may be revoked.

The following *four* questions refer to New York state:

5 Give, with reference to each of *two* of the following, *a*) mode of election, *b*) length of term, *c*) manner of compensation, *d*) *two* duties: assessor, county treasurer, constable.

6 Give the substance of the provision of the constitution regarding *a*) registration of voters, *b*) forest preserve. Give a reason for *one* of these provisions.

7 State the manner of obtaining office, the length of term and the chief duty of *each* of the following: comptroller, railway commissioner, justice of supreme court.

8 Mention the successive steps in the progress of a bill from its introduction in the legislature to its final passage.

The following questions refer to the United States:

9 Describe the legislative process of dealing with a bill that has been returned without the president's approval.

10 Mention *two* privileges conferred by the constitution on senators and representatives in congress, and give a reason for each provision.

11 Define writ of habeas corpus. Explain the importance of this writ as a protection to the right of personal liberty.

12 Give the substance of the constitutional provision regarding each of *three* of the following: direct taxes, jury trial in civil cases, search warrants, fugitive criminals.

13 Mention *a*) *two* leading powers of congress, *b*) *one* prohibition on the United States, *c*) *two* prohibitions on the states.

14 Give the name of the executive department that has charge of matters relating to *a*) custom-houses, *b*) patents, *c*) diplomatic correspondence, *d*) army supplies, *e*) education.

15 Give in substance the provision of the law governing the presidential succession.

High School Department

168TH EXAMINATION

CIVICS

ırsday, March 28, 1901 — 1.15 to 4.15 p. m., only

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10 questions but **no more.** *If more than 10 are answered only* *'o answers will be considered. Each complete answer will* *credits. Papers entitled to 75 or more credits will be accepted.*

ıe *five* of the following terms: taxes, political right, :aucus, convention, usury, alien.

historical facts showing the antiquity of the town, .ain the importance of the township form of local ent.

arguments for or against state control of the police ɜnts of large cities.

ɜ the essential rights of non-combatants in time of war. ; the duties of neutral nations?

ɔwing *five* questions refer to New York state:

:, with reference to the chief executive officer of the ɛ) title, *b*) length of term, *c*) *three* duties.

:ribe the organization and state the principal function ate civil service commission.

:, with reference to *each* of the following officers, *a*) f term, *b*) *two* duties: county treasurer, lieutenant-·, superintendent of banking.

lain the necessity of legislative committees. State ; that may result from transacting business through ımittees.

: in substance the provisions of the constitution in re-contracting debts on the part of the state.

ɔwing questions refer to the United States:

te the qualifications required for membership in the representatives and explain the importance of *two* of ȷuirements.

ıte the provision of the constitution regarding bills y the president. Give a reason for this provision.

ıat is a copyright and how is it obtained? State the and the number of years for which a copyright is

.te how *each* of the following is chosen and mention cipal duties of each: speaker of the house of repre-:s, secretary of state.

'e the substance of the constitutional provision regard-ıblic records, *b*) protection to states by the nation.

ntion *a*) *two* prohibitions on the United States, *b*) *three* powers of congress.

corporation. Mention a possible disadvantage.

3 Compare the government of a county in the United S with that of the English shire.

4 What is a mortgage? Mention *three* things essential validity of a real estate mortgage and explain how the h of such a mortgage may enforce his claim in case of defa payment.

The following *five* questions refer to New York state:

5 State the provision of the constitution in relation time of election of city officers in cities of the first and s classes. Give a reason for this provision.

6 Give the length of term and *two* duties of *each* following officers: county clerk, secretary of state, ra commissioner.

7 State the limits of the jurisdiction of the county co civil cases. Mention *two* duties of the surrogate.

8 Give with reference to the chief officer of the town a b) manner of compensation, c) *three* duties.

9 Give the substance of *two* important laws passed legislature at its recent session.

The following questions refer to the United States:

10 Give the substance of the constitutional provision r ing a) the admission of new states, b) powers reserved to

11 Mention the various departments of the executive of the government. State how the heads of these depart are chosen.

12 What are the chief duties of an ambassador? E why ambassadors are not subject to the laws of the co

High School Department

166TH EXAMINATION

ECONOMICS

Wednesday, September 26, 1900 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: *value, interest, property, wealth, profits, fixed capital, speculation.*

2 Explain how the invention of improved agricultural implements may affect the value of farm lands.

3 Show wherein labor regarded as a commodity differs from other commodities.

4 "International trade arises from the differences in the comparative cost of producing the articles exchanged." Explain the above quotation.

5 Show by illustration the evils resulting from the formation of trusts.

6 Explain why women often receive less wages than men engaged in the same class of employment.

7 Mention the causes that lead to financial panics. Illustrate.

8 Should capital and labor be regarded as partners in industry or as competitors? Explain.

9 Distinguish between call loans and time loans. Show why rates of interest on the former class of loans fluctuate more than those on the latter class.

10 Mention *two* advantages and *two* possible disadvantages of free competition in trade.

11 Give arguments for or against the nationalization of railways.

12 State *two* characteristics of a just system of taxation. Mention *three* proper purposes of government expenditure.

13 Distinguish between market value and natural value. Show that market value tends to conform to natural value.

14 Discuss the advantages of arbitration as a remedy for labor troubles. What difficulties arise in applying this remedy?

15 Give arguments for or against the free coinage of silver at a fixed ratio.

High School Department

167TH EXAMINATION

ECONOMICS

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: economics, labor, commodity, exchange, boycott, profits, circulating capital.

2 State the basis of individual right to property and mention *one* limitation of this right.

3 State the advantages and the disadvantages of the management of charities by *a*) public authorities, *b*) private organizations.

4 Give reason for or against considering *each* of the following as wealth: physical strength, a lawyer's library, growing crops, government bonds.

5 Mention an occupation in which wages are *a*) liable to fluctuate greatly, *b*) not likely to fluctuate greatly. Give reasons in each case.

6 What are natural agents? Show by illustrations how these agents contribute to the effectiveness of labor.

7 Define the term trust. Show how the formation of a trust may *a*) lower the price of a commodity, *b*) raise the price of a commodity.

8 Mention with reference to the division of labor *a*) *three* restrictions, *b*) *two* possible disadvantages to employers.

9 State conditions under which there would be a decline in the rent value of *a*) a given piece of farm land, *b*) a village store.

10 Distinguish between direct taxation and indirect taxation. Which method is preferable for property owners? Explain.

11 Give economic arguments for or against a presidential term of six years in the United States.

12 Mention circumstances governing the price that an author will receive for a book manuscript.

13 Give arguments for or against the nationalization of *a*) the telegraph, *b*) farm lands.

14 State the conditions under which a strike among workmen is likely to be successful. Illustrate by reference to the recent miners' strike in Pennsylvania.

15 Discuss the relative merits of gold and silver for use as money, touching on *a*) concentration of value, *b*) convenience in use, *c*) stability of value.

High School Department

168TH EXAMINATION

ECONOMICS

Friday, March 29, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following terms: production, strike, arbitration, money, finished product, price, bimetallism.

2 State the two considerations that determine the value of an article. Show how free competition tends to give stability to values.

3 What is wealth? Mention *two* sources of wealth. Show that the increase of wealth is a sign of civilization.

4 Show how the productiveness of labor is influenced by *a*) social security, *b*) domestic environment, *c*) general intelligence of workmen.

5 Mention *four* conditions necessary to the prosperity of a great iron industry.

6 Show by illustrations that consumption of capital is necessary to the production of wealth.

7 State *two* ways in which credit is useful to industry. Mention *two* evils resulting from abuse of credit.

8 State and illustrate the law of diminishing returns.

9 Show how rates of interest are affected by *a*) character of the borrower, *b*) permanency of investment, *c*) stability of the government.

10 Give *three* reasons why workmen are paid higher wages in the United States than in Germany.

11 Explain the decrease in rural population in many localities during the past 10 years.

12 State the object and explain the workings of a clearing-house.

13 State and illustrate Gresham's law.

14 Show how the people are benefited by public ownership of public utilities.

15 State the purpose for which trade unions are organized. Show wherein trade unions may be *a*) helpful to workmen, *b*) harmful to workmen.

High School Department

169TH EXAMINATION

ECONOMICS

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: value, production, consumption, cooperation, cost, rent, utility.

2 Mention *a*) *two* sources of wealth, *b*) *two* requisites of wealth.

3 Distinguish, by examples or otherwise, between *a*) productive capital and unproductive capital, *b*) fixed capital and circulating capital. Mention a danger incident to the rapid increase of a manufacturer's fixed capital.

4 State *two* causes affecting *each* of the following: *a*) the general demand for skilled labor, *b*) the wages of women.

5 Show how the rate of interest on loans usually depends on the earnings of capital invested in business. Mention an exception to this rule.

6 Mention with reference to division of labor *a*) *two* limitations in its application, *b*) *three* advantages to workmen.

7 State what is meant by the *laissez-faire* doctrine and give a reason for or against its validity.

8 Distinguish between money and credit. Mention *two* forms of credit and state the effect on prices of an extended use of credit.

9 Give arguments for or against subsidizing American shipping engaged in foreign trade.

10 Give with reference to national banks of the United States *a*) manner of organization, *b*) *two* functions, *c*) *two* sources of profit.

11 Give economic arguments for or against taxing mortgages.

12 Show with reference to man's producing power the effect of *a*) physical vigor, *b*) mental capacity, *c*) moral qualities.

13 "Socialistic teaching strikes at the root of individuality and independent character."
Show the correctness or the incorrectness of the above statement.

14 What is meant by margin of cultivation? Show why this margin changes with changing prices.

15 Give *two* arguments for or against a general policy of protection on the part of the United States.

High School Department

168TH EXAMINATION

PSYCHOLOGY

Friday, March 29, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only the first 10 answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1 Define *five* of the following: instinct, sensation, reaction, heredity, visual image, faculty, induction.

2 A person on entering a room detects a peculiar odor which he finds emanates from violets; trace the psychologic processes involved.

3 Discuss the dependence of cognition on *a*) feeling, *b*) volition. Illustrate each case.

4 Mention and explain the law of association involved in *a*) recognizing a picture, *b*) memorizing a poem.

5 Describe and state the purpose of an experiment in experimental psychology. Discuss the validity of the conclusions reached.

6 State the difference between *a*) an hallucination and an illusion, *b*) a fact and a theory. Illustrate each case.

7 Distinguish between voluntary attention and involuntary attention. Trace the mental processes involved in an act of voluntary attention.

8 Give an explanation of habit from *either* the physiologic *or* the psychologic basis. State directions to be observed in the formation of a habit.

9 A says to B, "You must feel very happy." State *a*) why A can not know B's state of mind, *b*) why A is psychologically justified in making such a statement.

10 Show in detail how the concept of a tree is obtained.

11 Trace the psychologic processes involved in writing a letter.

12 Explain, with illustrations, the limitations of the imagination. Show how the imagination is involved in *a*) appreciation, *b*) aspiration.

13 On seeing a vicious dog, I conclude that he will bite; trace the successive steps taken by the mind in coming to this conclusion.

14 Give the psychologic basis of the following: "Each man must build his own world."

15 Explain what is meant by personal identity. Give, with explanation, an illustration of the loss of personal identity.

2 Give the principles of scientific method and show hov may be applied to the study of psychology.

3 Mention and explain *three* theories to account for the tion between the mind and the body.

4 Discuss, with illustrations, the interdependence of l ing, feeling and willing.

5 State in detail the difference between a sensation perception. Illustrate each.

6 Explain and illustrate the law of relativity as appl sensations.

7 Distinguish between memory and imagination. M *two* kinds of imagination and show, with illustrations, tl ference between them.

8 Give in detail an illustration to show that mental pro are constantly changing.

9 On passing a store you stop to look at the goods dis in the window; give a psychologic analysis of this act.

10 Mention, explain and illustrate *two* laws of assoc Show the practical importance of the power of associati

11 Show how voluntary action differs from *a*) insti action, *b*) reflex action. Illustrate in each case.

12 Explain the psychologic difference between attenti inattention. State the importance of attention in edu and show how the attention may be trained.

13 Explain, with illustration, the meaning of the foll "Wherever a mental process occurs, there must be a process to serve as its condition."

High School Department

169TH EXAMINATION

ETHICS

Tuesday, June 18, 1901—9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more.** *If more than 10 are answered only e first 10 answers will be considered. As this is an examination in hics all questions must be answered from an ethic standpoint. Each mplete answer will receive 10 credits. Papers entitled to 75 or more edits will be accepted.*

1 Define *five* of the following: conduct, volition, pleasure, ippiness, motive, right, normative science, hedonism, conience.

2 Explain the difference between a moral act and a non-moral t. Illustrate each.

3 Mention and explain the four cardinal virtues.

4 Describe in detail a symmetric character.

5 Give an argument for or against the moral worth of *each* the following: rivalry, pugnacity, pride.

6 Mention and discuss *three* virtues that should govern our lations with our fellowmen.

7 Show the error of carrying to extremes *each* of the followg: resentment, unselfishness, ambition. Illustrate.

8 Show how *each* of the following may aid in the development of character: environment, work, self-denial.

9 Discuss, with illustrations, the following statement: "If rery one does his duty in his own place, he also fulfils his duty the whole."

10 Discuss the question as to whether or not a lie is ever stifiable.

11 State what is meant by moral judgment. Should moral dgment be passed on the acts of *a*) an insane person, *b*) an toxicated person? Justify your position.

12 State when righteous indignation is justifiable and show, ith illustrations, how it contributes to the preservation of *a*) e individual, *b*) society.

13 Distinguish between egoism and altruism. Show how ch is necessary to the attainment of a complete life.

14 Give, with explanation, the difference between utilitanism and intuitionism.

15 Give an ethic analysis of duty. Should the ideal life be verned by duty? Explain.

First Test

Papers entitled to 75% will be accepted. 500 words to be dictate
minutes and to be transcribed in 75 minutes.

MINUTES

No one who has had correspondence with French m
women can have failed to remark the grace and cha
½ even their briefest notes * —the nice adjustment of
and phrase to express the relationship between sende
1 receiver, with the proper degree of respect or affection
To any one with a feeling for art the grace of Frenc
respondence is a perpetual delight, like a strain of b
½ ful music. *

There is nothing in which the character of the su
man or woman expresses itself more than in letter-writi
The graces of every day correspondence should be
2 vated * . . . What does it avail to know Latin a
"ologies" if one writes an uncouth, flabby, or ungr
½ note? To know just the right way * of saying the
that is to be said is an art more to be desired than
3 knowledge, and one that goes farther * in making life
able. Many a young person's career has been wrec
the maxim that "knowledge is power" . . . The con
½ ness of book-learning excites the antagonism * of a h
nature; while tact, kindliness and grace, the ingredi
a well expressed letter, are the sort of good that grow
4 abundant * the more it is communicated. There
better way of inculcating these qualities in childre
½ by insisting on careful and graceful letter-writing

Dear Frank: *Pine trees* has been returned to me in excellent condition. I am very glad you enjoyed reading it. The story goes to show, * I think, what good cause the southern people had for hating the carpet-baggers.

Yours
Percy

Joseph Beacham & Co.
5 London, Ont. *

Gentlemen: Your letter of June 29 is a painful surprise to me, and I have no hesitancy in saying that it raises a
½ strong presumption * of bad faith on your part. The machinery embodying my patent was sent you more than
7 four weeks ago on your agreement to set it up * and make an immediate and thorough test of its work on the various
½ kinds of timber with which your boom is stocked. * I hold your written agreement for the purchase of exclusive rights under my Canadian patents in case these tests proved sat-
8 isfactory and I have declined * to enter into negotiations with prominent men in Quebec, Toronto and Ottawa, till I
½ know the result of your tests. Now I am told * that you have done nothing—that your engineer has not been able to set up the machinery.

9 I have to inform you that unless you complete * your undertaking on or before July 14 I shall consider myself released from all engagements with you. On receipt of
½ your telegram within three days from date, * stating that you will pay all expenses, I will send my engineer to set up and start the machinery.

Very truly yours
10 Augustus Heinzelman *

SECOND TEST

Papers entitled to 75% will be accepted. Candidates for state business credentials must obtain at least 90%. 500 words to be dictated in 5 minutes and to be transcribed in 55 minutes.

The house of representatives, by a vote of 240 to 15, has passed a joint resolution providing for the election of senators by the direct votes of the people. This practically unanimous vote carries with it no great importance, for the
½ reason that the house has long been willing * to propose

such an amendment, and, the consent of the senate being
necessary, it is always understood that this can not be
obtained . . .
It must be conceded that there has been much in recent
years connected with the election of senators to cause the
1 tendency of public opinion to criticize * the present method,
as producing a marked falling off in the dignity, usefulness
and power of the senate . . .
The method of choosing United States senators is a part
of the form of government created by the constitution of
½ 1789, and in force now for 110 years. * The greatest diffi-
culty was to find a different method of constituting the two
houses . . . It was regarded as essential that this compo-
sition of the two houses should be based on entirely differ-
ent principles, unlike in their origin and derivation and
2 inspired by the like jealousy of each other. * If the two
were elected for the same period and by the same electors,
they would amount in practice to little more than two com-
mittees of the same house . . . When the federal consti-
tution was formed, the interest of independence for the sep-
½ arate states and the interest of union for the whole people *
were the two conflicting interests, and a compromise was
necessary. It was felt that in a federal government there
must be some institution, some authority, some body, pos-
sessing a veto, in which the separate states comprising the
federation would be equal . . .
Several plans were originally suggested in the constitu-
3 tional convention * . . . It was conceded that an election
of at least one branch of the proposed national legislature
directly by the people was a clear principle of free govern-
ment . . . Thus the principle of the independence of the
states prevailed in the formation of the senate, and that of
½ the sovereignty * of the nation predominated in the forma-
tion of the house. The senators, as they represent the
states, are chosen by their respective legislatures, not by
the people; they represent the states as the constituent
members of the Union . . . The true character of the
4 senator is that he is the representative, * but not the deputy,

of his state as such . . . The members of the house are the direct representatives of the people, apportioned according to population . . .

All foreign critics have found in the method of choosing the members of our senate a sufficient if not the sole cause of its excellence * as a legislative and executive authority . . .

While in point of dignity and authority the senate has in some respects disappointed the sanguine expectations of its founders, yet it is still a barrier to hasty legislation and certainly the most impressive part of our constitutional system, unless we except the supreme court. *

High School Department

167TH EXAMINATION

STENOGRAPHY

Thursday, January 24, 1901 — 9.15 a. m. to 12.15 p. m., only

NOTE — *Candidates may take one or both of these tests. The time for dictation and for transcription is indicated in each case. The shorthand notes and the transcript are to be collected by the examiner at the close of the period assigned for each transcript. Candidates are to specify the system followed in taking down the notes. Credits depend on the accuracy of the notes and of the transcription.*

FIRST TEST

Papers entitled to 75% will be accepted. 500 words to be dictated in 10 minutes and to be transcribed in 75 minutes.

MINUTES

Every good man, instead of feeling as the savage felt, that
he has no cares or duties for the future, aims at earning a
½ competence, * and seeks to lay by capital to yield revenue
sufficient to maintain his wife and children in comfort should
1 he become infirm or pass away. * If the man is wise, he
does not labor to save great sums of money to leave to his
½ children. He strives only for enough * to give them the
best of all fortunes, a good education . . . If a boy is left
2 with riches it ordinarily seems to him unnecessary * to
develop his powers . . .

Thus one of the fundamental differences between savage
and civilized life is the absence of thrift in the one, and its
½ presence * in the other. When millions of men save a
little of their daily earnings, these petty sums combined
3 make an enormous amount called capital, * about which so
much is written. If men consumed each day or each week
½ all they earned, of course there could be no capital; * that
is, no savings laid up for future use.

Now let us see what capital does in the world. We will
4 consider what the ship-builders do * when they have to
build great ships. These enterprising companies offer to
½ build an ocean steamship for, say, $2,000,000, * to be paid
only when the ship is delivered after satisfactory trial trips.
Before it is completed the company must spend nearly
5 $2,000,000. *

Where and how do the ship-builders get this sum of
money to pay the workmen, and all the people who fur-
½ nish material for the building of the ship? * They get it

from the savings of civilized men. It is part of the money
6 saved for investment by the millions of industrious people. . .*

Hence thrift is mainly at the bottom of all improvement . . .
Man must exercise thrift and save before he can produce any-
½ thing material of great value. * There was nothing built, there was no progress made; as long as man remained a thriftless savage.

F. R. Adams

7 New York Insurance Co. *

Dear sir: I beg to inform you that I am about to change my place of residence from 140 West End avenue, New
½ York * to 25 Main street, Pelham. Kindly give me permission to make this removal and continue in force the in-
8 surance on my furniture. * Also advise me of the amount of additional premium, if any.

Very truly yours

V. O. Minturn

Boston Book Co.

Boston, Mass.

½ Gentlemen: * I return your price-list herewith, having checked the books which I desire. Kindly express them at the earliest possible date and I will remit by New York
9 draft * as soon as they are received.

Yours truly

Philip Quail

Brown & Co.

Syracuse, N. Y.

½ Gentlemen: Invoice of goods received today. * We find that you have not shipped the two barrels of oyster-crackers ordered. If you can not furnish these at once please wire.

Yours very truly

0 John Porter *

tions, and some of the great companies admitted t
miners had other grievances. The significant con
was recently made that it was the strike which b
these grievances to the attention of some compani
that it was only through investigations begun aft
1 trouble broke out * that high officials came clearly
derstand the concessions that might reasonably be
It is the opinion of Mr Nelson that the whole distu
might have been avoided if the coal companies had
proper concessions at the start.

½ On the other hand, there were independent oper
whose relations with their employees had been alt
different. These operators lived in the mining
they understood the conditions of work; they had
timate knowledge regarding the condition of their la
It would be impossible for such employers to be s
2 surprised by the discovery that their men * had gri
of which they were not aware. They are practi
familiar with the whole situation in their district as
old time manufacturer in New England, who built
an establishment as made the prosperity of a pleasant
¼ where harmony prevailed between employer and emp

One great lesson of the strike seems to be that
poration system has not as yet produced any effect
stitute for the personal relations which formerly
between master and man, and which are still foun
cases of some operators who interest themselves to
2 suitable homes, * club-rooms, trained care for the

labor, are likely to be unyielding and inconsiderate with in-
4 ferior employees. * The local manager or overseer, wishing
to improve his own condition, frequently establishes and in-
sists on a narrow and shortsighted policy. Great companies
often trust too unreservedly in the practical wisdom of their
managers, with the result that the vast machinery of indus-
4 trial organization is needlessly thrown into confusion. * Is
is to be hoped that some new method may be established
by which the officials themselves may occasionally come into
direct conference with their men. By such a method man-
agers and overseers may be encouraged to take a more sym-
pathetic and perhaps more tactful attitude toward those under
4 their charge. * The mine operatives themselves may come
to feel that what seemed to them petty and irritating in-
justice has given way to a working policy of consideration
and fair play. The fact that this state of affairs has existed
5 at some of the mines shows that it might exist at all. *

Papers entitled to 75% will be accepted. 500 words to be dictat minutes and to be transcribed in 75 minutes.

MINUTES

In the last days of a session, congress seems not
a great school preparing for its final examinations a
½ ting ready for a long holiday. * There is in each cas
the same mixture of hurry, hard work, enthusias
pleasant anticipation.

1 Every congressman is busy as a session nears its
It is the last chance to get things done, and the suc
failure of a great measure may depend on some trifl
1½ cumstance. * In the rush to get the necessary bills tl
many loose legislative threads would be left hangin
2 it not for the vigilance of alert men. *

Appropriation bills and other important measure
this time receiving their finishing touches, in con
½ committee or elsewhere; and senators and represent
who were half indifferent regarding them at an earlie
now feel that the time when action is most effec
3 really come. * Members are seen hurrying from on
to the other, in and out of lobby and committee-r
½ eager conference with their associates, * or with the
in the house, or the "steering committee" in the
4 It seems to be a case of "now or never," and ever
is keyed up to his highest tension, like pupils takin
examination.

One of the last things congress does is to despatc

Ross & White
Chicago, Ill.

Gentlemen: Will you kindly advise us * as to the advisability of opening accounts with Brown & Co, Simpson &
5 Jones, and J. J. Peters, all grain merchants of your city? * Please wire at our expense.

Very truly yours
E. R. Phillips & Sons

J. R. Pierce
472 Broadway, New York

Dear sir: * Your application to act as our representative in New York, and your letters of recommendation have received attention. We are inclined to consider the matter
7 favorably * but taking all things into consideration, we think that a personal interview would be mutually satisfactory.

Business calls me to New York on Friday of this week, * and if you will dine with me at the Metropolitan club, at
8 seven, on that day, we will talk the matter over. * I hope that we may be able to make satisfactory arrangements.

Very truly yours
James Colson

Philip Evans
Minneapolis, Minn.

½ Dear sir: Buy us all the wheat * you can get at 72 or under, to the amount of 60,000 bushels, for immediate ship-
9 ment; commission same as on last order. * Wire the number of bushels you succeed in getting as we must find it elsewhere if you can not supply us. Ship over the Chicago
½ and Northwestern railway * with all possible despatch.

If the corn market remains steady you may buy us 10,000 bushels.

Yours very truly
0 Porter & Mason *

SECOND TEST

Papers entitled to 75% will be accepted. Candidates for state business credentials must obtain at least 90%. 500 words to be dictated in 5 minutes and to be transcribed in 55 minutes.

The expansion of the United States into the tropics has
given a new importance to the question of commercial edu-
cation. It indicates that we are on the eve of important
changes in both the political and the commercial world, and
½ also that the struggle for the control of new markets * is
becoming sharp. The tropics are the only regions whose
products are not well developed and in which competition
has not reduced the margin of profits toward the vanishing
point. It is true of the tropics more than of any other part
1 of the world, that its trade depends on a knowledge * of
the conditions of life and of the habits of people who are
beyond likelihood of immediate change. The rest of the
world is so closely united that articles in demand in one
land are likely to be desired in all . . . There is need not
½ only of a thorough understanding * of the laws of trade
and of the ways of doing business which are of universal
application, but also of that particular and technical knowl-
edge which will enable a merchant to undertake particular
lines of trade with special countries, without liability to de-
2 structive mistake. This need has for half a century * been
recognized in European countries, which found themselves
distanced in commercial pursuits, or called on by the exi-
gencies of their national life to seek for new ways. It has
resulted in the planting of certain schools for commercial
education of the higher grade, which have already become
½ distinguished, * and in the establishing of some systems of
commercial education, which are new and important . . .

It is only the man of science, trained in the technical
school of the highest grade, who, in every department of
industry—the mine, the laboratory, the electric plant, or
3 the steam railway— * finds his opportunity and is impera-
tively needed. It can not be that other conditions will be
permanently maintained in the business world. The mer-
chant who, through years of labor and intelligent industry,
has built up a great commercial house, can not see his suc-
cessful neighbor, the manufacturer, send his son to the
½ technical school, * and then to other lands for a year or two

of study of manufactories similar to his own without feeling grave anxiety for his own business, unless he furnishes his son with a similar intellectual equipment . . .

The course of instruction which the higher commercial
4 school should pursue * has received much attention in foreign countries. Pupils are to be taught to become good employees, good buyers, good sellers, good cashiers, good accountants. But the art of buying and selling and of recording these operations does not constitute the whole science of commerce, nor would it insure the success of any enter-
½ prise. * The art of organizing, administering and directing is fundamental, and must be based on economic science. The programs of the higher schools are intended to embrace courses in the various industries, and in the commercial subjects a knowledge of which would aid in determining
5 capability for important enterprises. *

on the accuracy of the notes and of the transcription.

First Test

Papers entitled to 75% will be accepted. 500 words to be dict minutes and to be transcribed in 75 minutes.

MINUTES

Benjamin Johnson
Boston, Mass.

Dear sir:—It gives me pleasure to say, in reply note of inquiry, that during an intimate business
½ tion, * extending over several years, I have fo
Brandon in all respects worthy of the greatest con
1 I feel sure that you would make no mistake * sho
decide to place him in the responsible position fo
he is an applicant.

Very truly yours
William How

½ My dear Professor Barr: *

I beg to introduce to you my friend, Dr Jame
man, whose studies in botany will, I hope, inte
2 through the originality * of his mind and met
should apologize for this intrusion on your valuab
½ were I not aware of the exceeding kindness with
you have encouraged younger fellow-workers,
whom is more appreciative of the honor than y
pupil and affectionate friend

3 Miles Par

The universal burst of grief which greeted the d

Queen Victoria never knew her father, Edward, Duke of
½ Kent, who died when she was not eight months old. * Yet
he was not a father of whom to be ashamed. From him she
inherited the best qualities of her race and a wonderful
5 power * of knowing and remembering people and of taking
a personal interest in them. To these must be joined a con-
½ sciousness of personal dignity and position, * always accom-
panied by a strong feeling of religion and of responsibility
to God . . .

6 Her reign was prolonged to 60 years and more. * The
line of her advisers, every one of whom had found it
worth while to take advice from her, stood unparalleled,
½ and they all confessed * when the time of office was over,
that no clearer head, no firmer will, no sounder judgment,
7 no purer conscience, no warmer heart than their Queen's *
had been with them in council.

There was a strange power in her presence. She had
½ never, in the full bloom of youth, been really handsome; *
her best friends could not accuse her of good taste in
dress; grief and age had had their way with her move-
8 ments; but she never failed, * from her earliest to her
latest years, to call up on all fitting occasions a dignity of
carriage equal to Elizabeth's, and a winning charm of
½ address * all her own.

The secret, then, of her mighty influence in a day when
9 royalty is supposed to be dying, and English royalty * to be
in fetters, is plain. She thought of her people first and of
herself afterward. Like Washington, like her own glorious
½ ancestor Alfred, * she did every duty, weighty or trivial, as
it came to her, as well as it could be done, and as in the
0 sight of God. *

SECOND TEST

Papers entitled to 75% will be accepted. Candidates for state business credentials must obtain at least 90%. 500 words to be dictated in 5 minutes and to be transcribed in 55 minutes.

A most absurd thing for men or women to do at any time of life is to allow the least approach of an idea that because the world owes them a living, the world ought to bring it
½ to them. This is not the way the world behaves. * It will pass by all who wait, and bestow on others who are working and striving the good things it has in store. It sometimes seems that there are those who, when their days of study are over, harbor the delusion that the time of
1 effort is past and that their educational equipment * ought of itself, and by its own momentum, to bear them to the easy haven of success. An indulgence in this delusion accounts for many of the wrecks that lie along the shore of life's activity.

I thoroughly enjoyed the days spent in unsuccessful and
½ tiresome search for any sort * of honest employment; but in all those days I never had a doubt that the world owed me a living, and I never abated a particle from my determination to gain what was owing to me. It is well
2 for us to keep our eye on the final goal * with bright anticipations; but we should not overlook the pleasures of striving that lie all along our way.

Not only will depression and self-distrust rob you of the joy found in doing and overcoming, but they will as surely
½ prevent you from reaching the rewards of success. * The troubles and obstacles you will inevitably encounter can not be overcome without courage and confident hope.

These are powerful forces, considered independently. They are, besides, of vital importance as elements of rational and useful self-reliance — which is the greatest
3 motive power that can be brought into your service. * The self-reliance of which I speak is not a mere bold, unjustifiable confidence in one's self — which is more properly called self-conceit; it is not an impudent assumption of ability to do any and all things, with no dependence except
½ luck for the outcome; it is not the crowding rush * for the front, regardless of other men's rights and of all the decencies and proprieties of life, and it is not the assurance of fools, who "rush in where angels fear to tread."*

The self-reliance which you need is a consciousness of
4 having a kind of strength * which you are willing to trust,
because you know the factors that compose it and the
1· training that has developed it. Calmly powerful and
steadily confident, it should always be generous and magnanimous.
It should grow more sturdy in the atmosphere
of high endeavor, and thus constantly lead to greater
¼ achievement . . . *

"The world owes us a living," but to win such a living
we need not dwarf our better natures nor forfeit our hopes
of true success. It is decreed that we can surely exact our
dues from the world and at the same time achieve a success
5 that shall be truly glorious. *

High School Department

166TH EXAMINATION

BOOKKEEPING

Wednesday, September 26, 1900—1.15 to 4.15 p. m., only

Answer the first five questions and five of the others but no more. If more than five of the others are answered only the first five answers will be considered. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.

1–2 From the following ledger footings and inventories make a balance sheet:

	Dr.	*Cr.*
Proprietor	$200 00	$8000 00
Cash	7657 00	5422 00
Merchandise	8210 75	5274 25
Expense	1041 00	
D. J. Gainor	150 00	600 00
O. A. Lytle	1728 00	1145 00
Beekman Bros	....	264 75
Porter & Mason	800 00	
Bills payable	1225 00	1500 00
Bills receivable	1824 25	630 00

Inventories: merchandise $4310.77, expense $575.

3–5 Make entries of the following items for double entry bookkeeping. Use a folio (double page) cash book for cash items and journal for all others:

Aug. 1, 1900. Began business with an investment of cash $5725, merchandise $3400, store and lot $7000. I owe Robert Taylor $350 on a promissory note.

Aug. 2. Sold Nathan Kilmer merchandise $348 and took in part payment his note at 60 days for $256. Cash sales $125.

Aug. 3. Bought of R. M. Capron merchandise $225, terms 5% off 10 days, net 30 days. Cash sales $140.

Aug. 4. Sold James Phillips merchandise $540 and received cash on account $215. Bought merchandise for cash $500.

Aug. 6. Bought of Frank Perkins merchandise $435.40 and gave on account a sight draft on James Phillips for $325. Bought books and stationery for office use and paid for them by check $20.

Aug. 7. Nathan Kilmer paid his note of Aug. 2, less discount 5%.

Aug. 8. Paid bill of Aug 3 in cash.

6 Post and close the merchandise account from the transactions given in questions 3–5, assuming the inventory to be $3100.

7 Write a letter of guaranty to Farnum Bros., assuming responsibility for payment of bill of goods purchased by Carl Jones to the amount of $250.

8 Mention and define *two* classes of accounts. Give the titles of *two* accounts in each class.

9 You order your broker to buy 100 shares of B & O stock on 10% margin. He buys at 90, and 10 days later sells at 95, brokerage ⅛% in each case. (Brokerage computed on par value of stock.) What is your net gain? [Take into account interest at 6% for money furnished by broker.]

10 A merchant buys goods listed at $725, with an option of discounts of 10, 10 and 5 with 90 days credit or 25% discount for cash. How much will he gain by borrowing money at 6% to pay the bill?

11 Illustrate the form of *two* of the following: certified check, invoice, shipping receipt [Omit printed limitations], account sales, due bill.

12 Compare single entry bookkeeping with double entry bookkeeping, stating, with explanation, *two* important points of difference.

13 Write in proper form a receipted bill of at least *five* items sold. Assume that a cash payment for part of the amount was made August 24 and the balance paid today.

14 Write the draft mentioned in the transactions of August 6, and show the journal entry of the transaction that should be made by *a*) the drawer, *b*) the drawee, *c*) the payee.

15 Define the following: *net capital, original entry, bill of lading, inventory, consignment.*

High School Department

167TH EXAMINATION

BOOKKEEPING

Wednesday, January 23, 1901 — 1.15 to 4.15 p. m., only

Answer the first five questions and five of the others but **no more.** *If more than five of the others are answered only the first five answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–3 Make entries of the following items for double entry bookkeeping [Use a double page cash book for cash items and a journal for all others]:

June 1, 1900. Began business with an investment of $10,000 in cash. Bought of J. M. White merchandise $675; gave in payment cash $425 and note at 30 days, with interest, for the balance.

June 2. Sold William Bain merchandise $320 and received cash on account $275. Drew $50 from capital for personal use.

June 8. Sold Percy Johnson merchandise $250. Terms, 5% off 5 days, net 60 days.

June 9. Paid clerk's salary $25.

June 11. Bought of B. S. Colgan, Boston, Mass., merchandise $150 and gave him on account sight draft on William Bain for $45.

June 12. Percy Johnson paid his bill of June 8.

June 16. Prepaid my note of June 1, favor of J. M. White.

4–5 Mention in order *five* important steps in closing a double entry ledger. Illustrate by closing the ledger whose footings are given in questions 13–14.

6 You owe Thomas M. Bailey, Chicago, Ill., $500. Show in detail how you would make payment. Illustrate. Give the entry of the transaction you would make in your books.

7 Write the draft mentioned in the transaction of June 11. What action should be taken in case William Bain refuses to pay this draft?

8 On a promissory note for $1800, dated Jan. 2, 1900 and bearing 4% interest, the following payments were made: Feb. 17, $75, May 2, $50, July 12, $125. How much was due Jan. 2, 1901?

) My agent buys for me 8000 bushels of wheat at 80 cents. days later he sells 4500 bushels at 83 cents. After another days he sells the remainder at 85 cents. Storage charges, 2 nts a bushel. Commission 1 cent a bushel for buying and · selling. Interest for use of money furnished by agent 6%. ›w much will I gain or lose?

.o Give *two* forms of trial balance. Which form do you :fer and why? How often would you make a trial balance? ve reasons.

1 Illustrate the form and state the purpose of *each* of the lowing: indorsement in blank, indorsement in full, indorse-ent without recourse.

12 Rule a page of your bank pass book and make entries in involving *a*) cash deposited, *b*) a note discounted.

13–14 From the following ledger footings and inventories .ke a balance sheet:

	Dr.	*Cr.*
Proprietor	$225 00	$4500 00
Cash	8012 50	7459 10
Merchandise	7350 00	3517 25
Furniture and fixtures	515 00	
Bills payable	2900 00	3810 00
Bills receivable	2705 00	1942 00
Expense	150 00	
Interest	12 46	17 15
Discount	9 33	6 59
F. R. Peters	825 40	1577 60
G. D. Miner	500 00	500 00
Black & Co.	1050 00	895 00

Inventories: merchandise $5910, furniture and fixtures $315.

15 Define the following: sales book, bill book, invoice, pro-it, trade discount.

High School Department

168TH EXAMINATION

BOOKKEEPING

Wednesday, March 27, 1901 — 1.15 to 4.15 p. m., only

Answer the first five questions and five of the others but no more. *If more than five of the others are answered only the first five answers will be considered. Division of groups is not allowed. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted.*

1–3 Make entries of the following items for posting to a double entry ledger [Use double page cash book for cash items and journal for all others; put no cash items in journal]:

Mar. 1, 1901. Began business with cash $3600, merchandise $2500 and Charles Perkin's interest bearing note at 90 days for $450, dated January 7, 1901. Bought office furniture for cash $150. Cash sales $94.

Mar. 5. Sold Peter White merchandise $350 and received cash $125 and his note at 60 days for the balance. Bought merchandise for cash $565.

Mar. 7. Charles Perkin prepaid his note of January 7.

Mar. 8. Sold James Dorn merchandise on account $65.

Mar. 9. Sold Porter Mason merchandise $248. Terms 5% off 5 days, net 30 days.

Mar. 11. Bought of Malcolm Ford merchandise $375; gave in payment sight draft on James Dorn for $65 and my note at 30 days for the balance.

Mar. 12. Porter Mason paid his bill of March 9.

Mar. 15. Had Peter White's note discounted at the National commercial bank at 6%.

4 Post and close the merchandise account covering transactions given in questions 1–3, assuming merchandise on hand to be worth $2850.

5 What is the general principle on which double entry bookkeeping is based? How would you determine whether any item should be debited or credited? Illustrate by reference to the transaction of March 11 in questions 1–3.

6 Mention *three* accounts whose balances show resources or liabilities; *two* accounts whose balances show losses or gains; *one* account that never has a debit balance; *one* account that never has a credit balance.

ention and describe the books that you consider requisite 'holesale provision business.

In closing a certain double entry ledger, the balances of .ccounts were as follows: merchandise debit $5432.13, ;e debit $560, Edward Winsor credit $500, James Phillips 652.40, Samuel Arden credit $928.33, bills payable credit 34, bills receivable debit $2811.17, trade discount credit ;. The cash on hand was $2350.52, merchandise per in-y (not entered in ledger) was $8156.46 and the original nent was $8000. Make a trial balance and balance sheet.

Rule a page of an ordinary sales book and enter in it all ms in questions 1–3 which should properly be entered 1 a book.

. dealer buys a bill of goods listed at $1250 and is allowed ion between commercial discounts of 10, 10 and 5 with 's credit or 25% discount for cash. How much will he y borrowing money at 6% to pay the bill?

Vrite, from questions 1–3, *a*) the promissory note men- in the transactions of March 1, *b*) the draft mentioned transaction of March 11. When and why should a note :t be protested?

Vrite a letter to Smith & Co., Chicago, Ill., ordering 1000 s of wheat. State how and when you wish it shipped e limit as to price, also give such references as would be ary if you were unknown to the firm.

)istinguish between an expense account and a furniture :tures account when both are kept. Which of these ac- includes the other when only one is kept? Under what ıstances would an entry appear on the credit side of ıre and fixtures account?

ohn Brown bought of Wilbur Johnson the following: , 1901, 2 barrels flour @ $5.75; Feb. 5, 50 pounds corn @ 4½ cents; Feb. 7, 100 pounds sugar @ 6 cents; Feb. 8, ,ds coffee @ 38 cents; Feb. 11, 2 pounds tea @ 80 cents. 1 payment of $15 was made on Feb. 28. Balance paid Make a receipted bill of these items in proper form.

High School Department

169TH EXAMINATION

BOOKKEEPING

Wednesday, June 19, 1901 — 1.15 to 4.15 p. m., only

Answer the first four questions and six of the others but no
If more than six of the others are answered only the first six an
will be considered. Each complete answer will receive 10 cr
Papers entitled to 75 or more credits will be accepted.

1–3 Make entries in cash book and journal of the follo
transactions for double entry bookkeeping.

June 1, 1901. Began business with assets as follows:
$5000, merchandise $4500 and Thomas Murray's 90 day
for $575, dated May 11, 1901. I have accepted James Wh
draft, favor of William Black, due July 3; $245.

June 3. Sold J. D. Wilbur merchandise as follows: 25
rels flour @ $4; 2 tons bran @ $20; 20 bushels corn @
Terms, 5% off 5 days, net 30 days.

June 4. Sold Johnson & Son 100 barrels flour @ $4;
barrels rye flour @ $3.

June 5. Bought of Porter & Mason 100 barrels flour @ $
Terms, 1% off 2 days.

June 6. Received of Johnson & Son their note at 30
for $225 in part payment for bill of June 4. Gave Port
Mason check for merchandise bought June 5.

June 7. J. D. Wilbur paid his bill of June 3. Cash sales

June 8. Sold merchandise for cash $125. Drew from b
ness for personal use $46.50.

June 10. Had Johnson & Son's note (June 6) discounte
bank and proceeds placed to my credit.

June 11. Thomas Murray paid his note, less interest all
for unexpired time.

June 12. Bought merchandise of Phillips & Co. $250,
gave in payment a sight draft on Johnson & Son.

June 13. Bought of R. S. Adams merchandise $125
paid for it by check on National commercial bank.

4 Post and close the merchandise account for the
transactions, assuming merchandise on hand to be
$5000.

hat is the general principle regarding the debits and in a cash book? Give directions for opening and bal- such a book. How may the correctness of the cash book ed?

aw the check referred to in the transaction of June 13, ow the entry that should appear on the stub of your book.

ake in proper form an account sales of 500 barrels flour you on commission in three different lots. Freight 20¢ l; cartage 8¢ a barrel; commission 2½%.

rite *a*) a promissory note of which Alfred Brown is the and James Lockwood the payee, *b*) a sight draft of you are the drawer, Philip Rowe the payee and William e the drawee.

mpare single and double entry bookkeeping with re- o *a*) kind of accounts, *b*) manner of recording trans- , *c*) detection of errors.

ost from the transactions in questions 1–3 such items as appear in the ledger under the single entry system.

ule such special columns in a cash book as would save n posting, and enter therein all suitable items found in ns 1–3.

promissory note for $1250, dated May 5, 1900, bears lowing indorsements: Aug. 15, 1900, $125; Jan. 4, 1901, April 19, 1901, $143. How much is due today?

ou have received the following telegram from Fisher & , Chicago, Ill.: Goods received. Piece six not as d. Explain. Entire lot damaged by water.

r investigating the matter write an explanatory letter.

escribe a method of filing business papers.

efine negotiable paper, solvency, bill of lading, inven- onsignment.

High School Department

166TH EXAMINATION

DRAWING

Thursday, September 27, 1900—1.15 to 4.15 p. m., or

Answer 10 questions but **no more,** *including at least one from e the three divisions. If more than 10 are answered only the fi answers will be considered. Division of groups is not allowed. ings may be in pencil, charcoal, pen and ink or water-colors. complete answer will receive 10 credits. Papers entitled to 75 o credits will be accepted. At close of examination inclose work in sheet, and place declaration and signature on last page of double*

PICTORIAL

1–2 Draw free hand, in light and shade, a group cons of a cylinder, a cube and a sphere.

3 Copy fig. 1, enlarging one fourth:

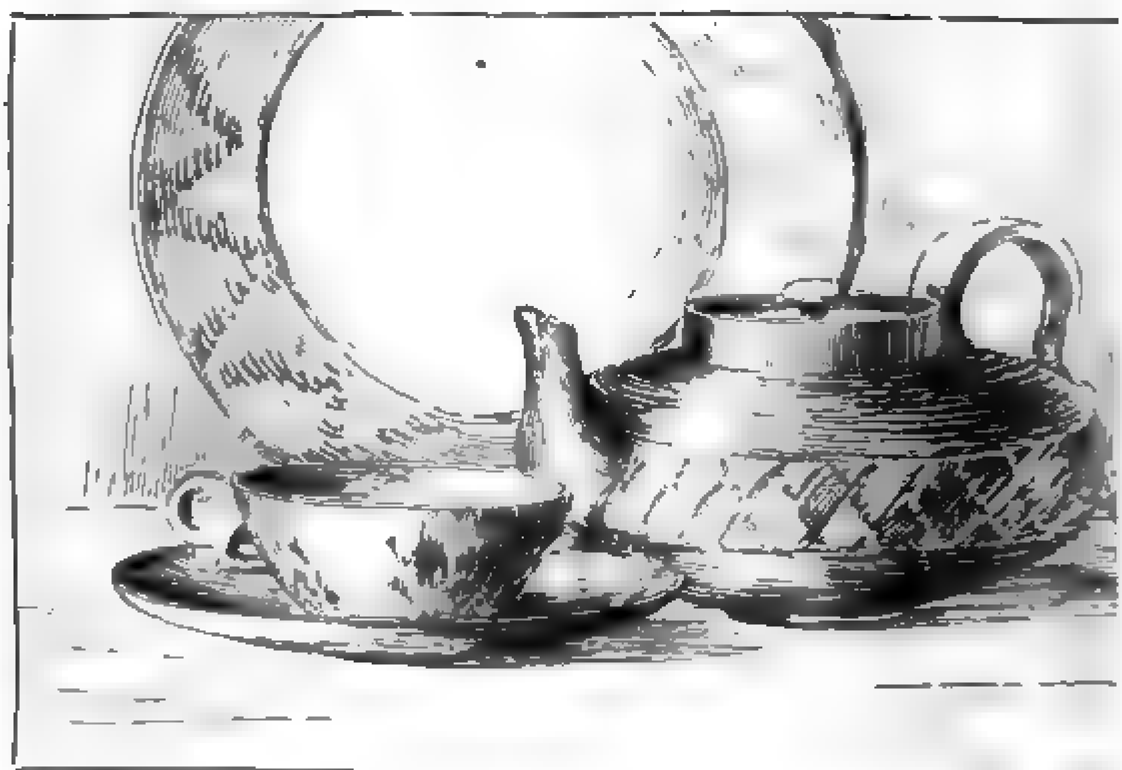

Fig. 1

4–5 Draw free hand, in a rectangular inclosing form, a containing the following elements: a farm-house showin the brow of a hill, a road, trees. [Other elements m used if preferred.]

)ECORATIVE —FREE HAND AND INSTRUMENTAL

Tracing and transferring allowed

Copy fig 2, enlarg- fourth

Or

· an original deco- nitial letter.

)raw a door hinge nted with a simple

raw the Roman ıs husk

EOMETRIC

ISTRUMENTAL

all working lines

ake the working g of a cylindric ob- Give dimensions.

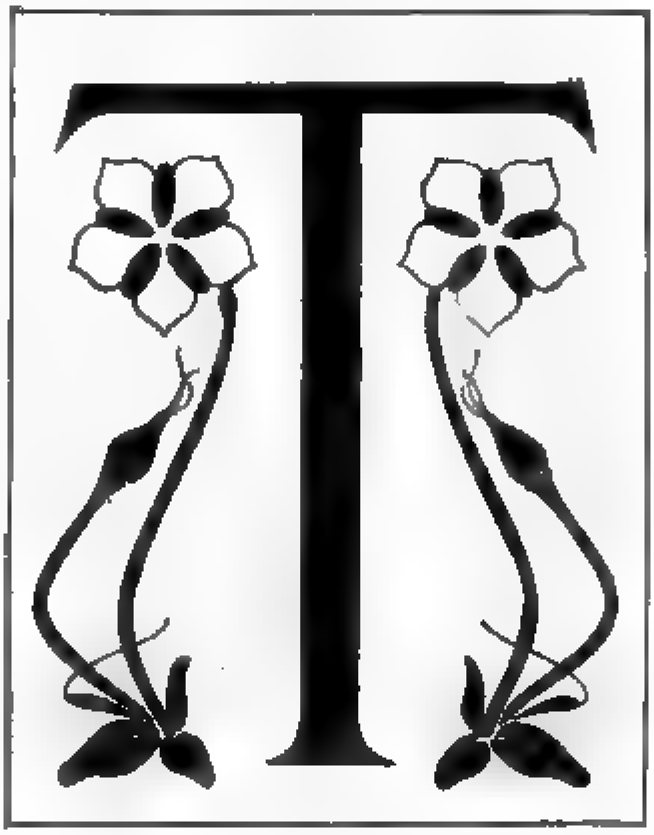

FIG. 2

raw the plan and elevation of a square pyramid whose vertical.

raw the developed surface of the frustum of a cone.

onstruct a regular pentagon, and within it a five-pointed .ose points shall be at the angles of the pentagon.

evelop the convex surface of a cylinder whose base is in diameter and whose altitude is 1½ inches.

High School Department

167TH EXAMINATION

DRAWING

Friday, January 25, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more,** *including at least one from the three divisions. If more than 10 are answered only the j answers will be considered. Division of groups is not allowed. may be in sight of candidates if desired. Drawings may be in charcoal, pen and ink or water-colors. Each complete answer : ceive 10 credits. Papers entitled to 75 or more credits will be a. At close of examination inclose work in double sheet, and place a tion and signature on last page of double sheet.*

PICTORIAL

1 Draw free hand a twig bearing leaves. Give the of the plant from which the twig is selected.

2 Copy fig. 1, enlarging slightly.

3 Draw free hand a vase standing in front and below the eye, possessing beauty through its proportion and curvature of line.

4–5 Make a drawing of a pleasing group containing an umbrella and a traveling bag. [One additional element may be supplied.]

FIG. 1

DECORATIVE — FREE HAND AND INSTRUMENTAL

Tracing and transferring allowed

6–7 Arrange in an inclosing form *one* of the followin spray of flowers, *b*) a branch bearing fruit and leaves, *c*)

8 Make a simple design for a pamphlet cover. [T may suggest the design.]

10 Make a design in which a historic ornament or some fication of it occurs. Write the name of the style of his- ornament used. [Answer may be in silhouette.]

GEOMETRIC—INSTRUMENTAL

Show all working lines

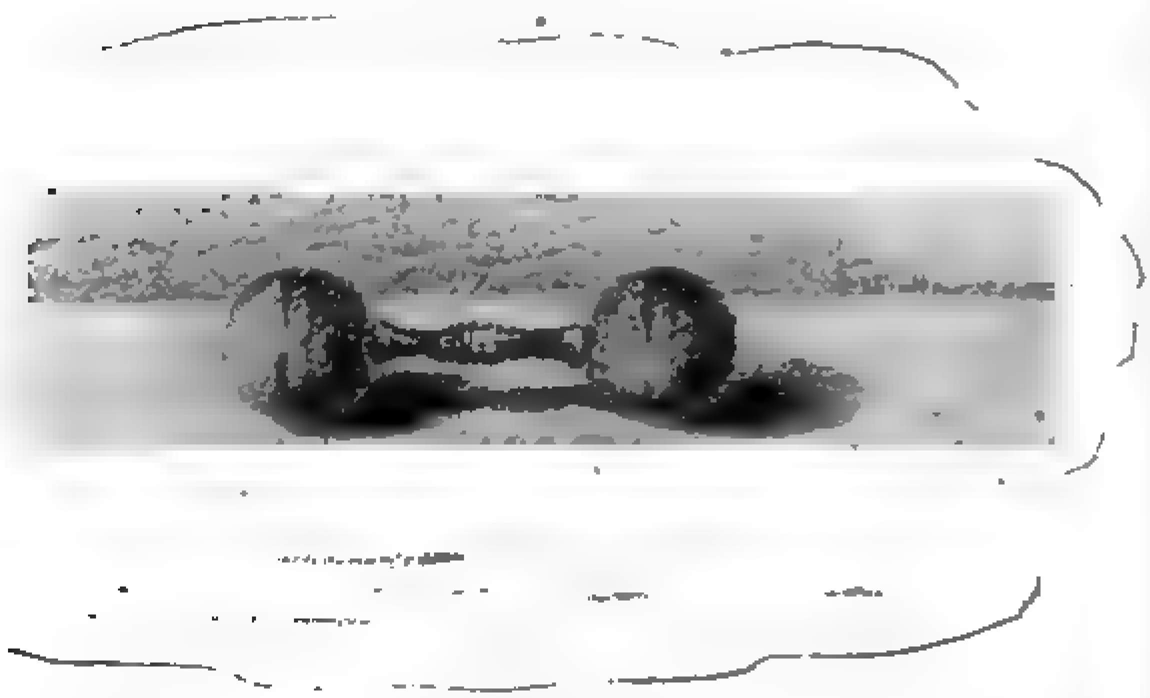

FIG. 8

Make a working drawing of the object represented in . Draw the long axis three inches.

Draw the developed surface of a cone, the diameter of e base is 2", slant hight 3".

Inscribe a regular octagon in a circle whose diameter is 3".

Construct a triangle whose angles are 60°, 30°, 90°.

Divide a line 4" long into three equal parts. [Leave all ruction lines.]

High School Department

168TH EXAMINATION

DRAWING

Friday, March 29, 1901 — 1.15 to 4.15 p. m., **only**

Answer 10 questions but **no more,** *including at least one from ⟨cut off⟩ the three divisions. If more than 10 are answered only the ⟨cut off⟩ answers will be considered. Division of groups is not allowed. ⟨cut off⟩ may be in sight of candidates if desired. Drawings may be in ⟨cut off⟩ charcoal, pen and ink or water-colors. Each complete answer ⟨cut off⟩ ceive 10 credits. Papers entitled to 75 or more credits will be ac⟨cut off⟩ At close of examination inclose work in double sheet, and place d⟨cut off⟩ tion and signature on last page of double sheet.*

PICTORIAL

1 Copy fig. 1, enlarging one half.

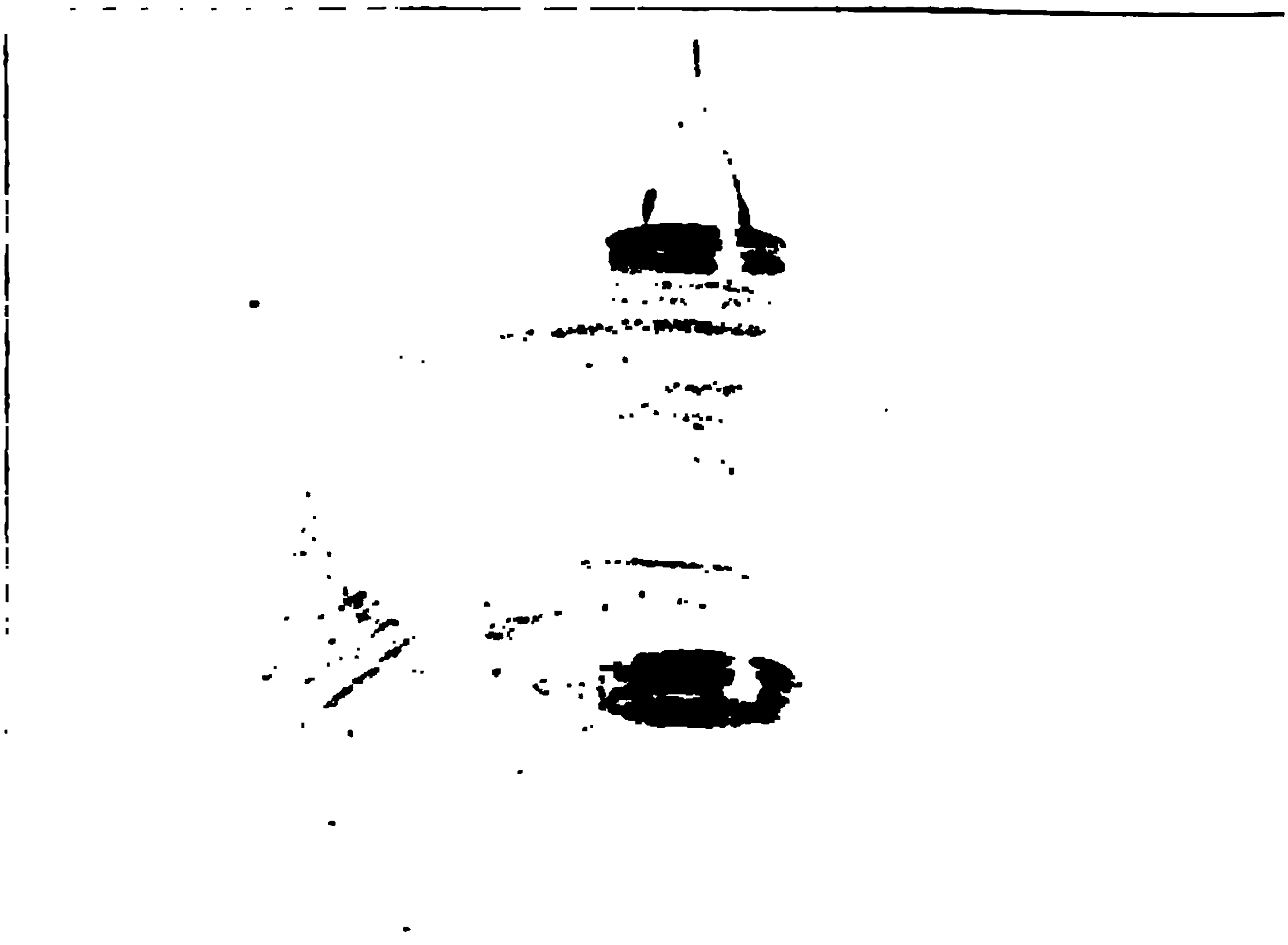

Fig. 1

2 Make a sketch of some person near you.

3-4 Draw in light and shade a group of two objects.

5 Draw from memory a bit of landscape.

DECORATIVE — FREE HAND AND INSTRUMENTAL

Tracing and transferring allowed

6 Sketch a plant form and from it conventionalize *tw*⟨cut off⟩

7 Draw a Greek ornament. Write name underneath

:opy fig. 2, enlarging one fourth. [An original decorative osition may be substituted.]

FIG. 2

o Design a conventional ornament to be executed in , suitable for the back of a chair.

GEOMETRIC — INSTRUMENTAL

Show all working lines

Draw plan and elevation of an equilateral triangular .

Draw the developed surface of a square pyramid, whose s 2″ and whose slant hight is 3″.

Construct a regular pentagon.

15 Make a working drawing of an object based on the ler. Write underneath name of object.

High School Department

169TH EXAMINATION

DRAWING

Friday, June 21, 1901 — 1.15 to 4.15 p. m., only

Answer 10 questions but **no more,** *including at least one from each of the three divisions. If more than 10 are answered only the first 10 answers will be considered. Division of groups is not allowed. Objects may be in sight of candidates if desired. Drawings may be in pencil, charcoal, pen and ink or water-colors. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted. At close of examination inclose work in double sheet, and* **place** *declaration and signature on last page of double sheet.*

PICTORIAL

1 Make a sketch of some object near you. Accent lines to express light and shade.

2–3 Copy fig. 1, enlarging one fourth.

Or

Draw from memory or imagination a sketch similar to fig 1

Fig. 1

4–5 Make a drawing to illustrate *one* of the following: *a)* parallel retreating lines seem to converge, *b)* a circle seen obliquely appears elliptic.

)ECORATIVE — FREE HAND AND INSTRUMENTAL

Tracing and transferring allowed

Make a design for the cover
ook, using as a motive some
tionalized plant form.

etch a historic unit or a his-
esign.

range a spray of flowers in
ong so as to make a pleasing

opy fig. 2, enlarging one

Or

gn a decorative initial letter.

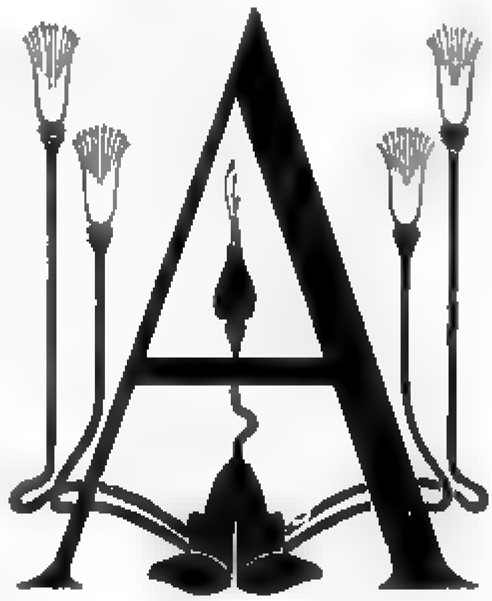

FIG. 2

GEOMETRIC — INSTRUMENTAL

Show all working lines

raw the plan and elevation of a cylinder whose diameter
nd whose altitude is 2″.

raw a circumference through three given points.

raw the developed surface of the frustum of a cone.

onstruct a quatrefoil.

Iake a working drawing of a square pyramid.

High School Department

167TH EXAMINATION

ADVANCED DRAWING

Monday, January 21, 1901 — 9.15 a. m. to 12.15 p. m., only

Answer 10 questions but **no more,** *including at least one from each of the three divisions. If more than 10 are answered only the first 10 answers will be considered. Division of* **groups is not allowed.** *Objects may be in sight of candidates if desired. Drawings may be in pencil, charcoal, pen and ink or water-colors. Each complete answer will receive 10 credits. Papers entitled to 75 or more credits will be accepted. At close of examination inclose work in double sheet, and place declaration and signature on last page of double sheet.*

PICTORIAL

1–2 Draw a group in which the following points shall be considered: relationship between objects, leading member, variety in position, pleasing outline, unity.

3–4 Copy fig. 1, enlarging one fourth, *or,* use fig. 1 enlarged as one element in a group of three or more elements suitable in character and treatment.

FIG. 1

5 Sketch from memory or imagination a bit of landscape

ORATIVE—FREE HAND AND INSTRUMENTAL

Tracing and transferring allowed

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FIG. 2

es of the base and at an angle of 30° to its base.
elevation and real shape of section.

the developed surface of the frustum of a cone
ensions are as follows: diameter of lower base 3",
ase 2", altitude 3".

nscribe a circle about a scalene triangle. Inscribe
ain the same triangle.

ruct the following figures each having a side 1" in
a regular hexagon, *b*) a regular octagon.

PICTORIAL

1 Make a drawing, in light and shade, of some obje
room.

2–3 Copy fig. 1, enlarging one fourth.

Or

Draw a group similar in character to fig. 1.

Fig. 1

4–5 Draw a group in which the following points are co
relationship between objects, leading member, variet
tion, pleasing outline, unity.

DECORATIVE — FREE HAND AND INSTRUMENT

9 Copy fig. 2, enlarging one fourth.

Or

raw an original design similar in character to fig. 2.

Make a decorative design for a surface covering, using e historic ornament as a motive.

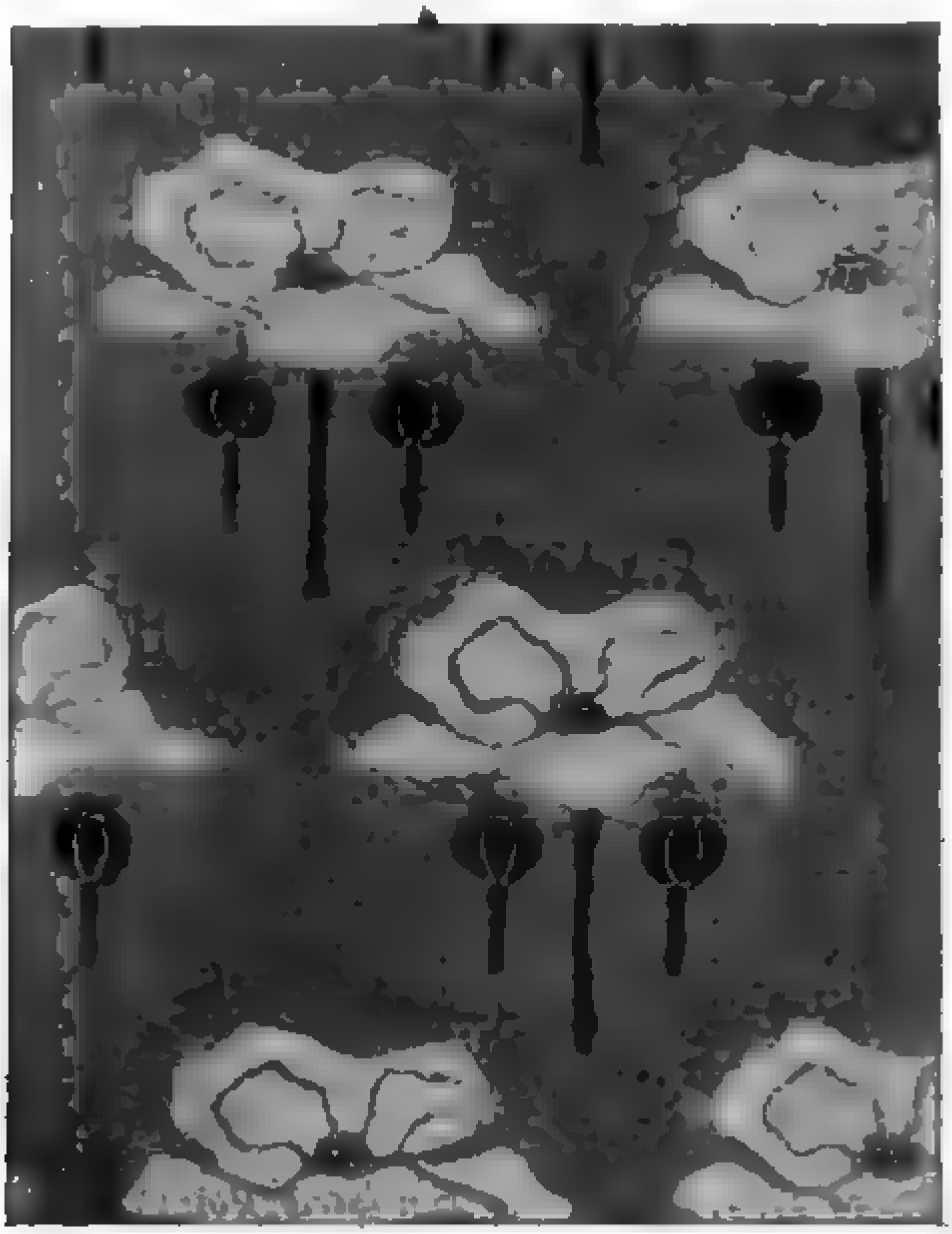

FIG 2

GEOMETRIC — INSTRUMENTAL

Show all working lines

-12 A cylinder 2″ in diameter is cut by a plane at an angle o° to its axis. Draw the real shape of the section.

; Draw the plan and elevation of a vertical cylinder support- a square plinth.

; Draw the developed surface of an obliquely truncated are prism.

; Draw front and top views of a hexagonal tablet when it is arallel to the vertical plane, *b*) at an angle of 60° to the ver- l plane and perpendicular to the horizontal plane.

2 Write words containing *five* variant forms of the pr
State under what conditions each form would be preferre

3 Give *five* words derived from the stem *scop* and s
analysis the meaning of each.

4 Show by analysis how the words in *each* of the fo
pairs differ in meaning: *healthy*, *healthful*; *emerge*, *im*
inflict, *conflict*; *revive*, *survive*; *relate*, *dilate*.

5 Analyze *each* of the following words, giving the
ing of each part: *ambulance*, *convince*, *permanent*, *qua*
quarantine.

6 Give the meaning of the stem in *each* of the fo
words: *obvious*, *incorporate*, *crusade*, *example*, *compa*
gate, *deride*, *paragraph*, *satisfy*, *surrogate*.

7 Give the meaning of each of *five* of the following p
circum, *bi*, *poly*, *se*, *auto*, *trans*, *semi*, *ad*. Write senten
taining words formed by using the five prefixes selecte

8 Give *five* words derived from the stem *scrib*. Sh
the differences in meaning in these derivatives are du
prefixes or suffixes.

9 Form a word from *each* of the following and wr
tences containing the words formed: *aud*, *cred*, *plumb*,

10 Show by analysis the idea common to *each* of the
ing pairs of words: *accord*, *concord*; *irruption*, *erupti*
cede, *proceed*; *elect*, *select*; *deluge*, *dilute*. Point out th
ences in meaning.

11 Write sentences, using correctly *each* italicized
question 12

12 Show by analysis the meaning of *each* of the fo
analyze, *admirable*, *anatomy*, *epidemic*, *panorama*. W
tences in which these words are correctly used.

13 Show how the suffixes in the following words a
meaning or use: *readable*, ... *violet*, *fruitless*, *straighten*
thi...

University of the State of New York

High School Department

PUBLICATIONS

ion reports. University of the State of New York—Ex
ion dep't Annual rep't 1894-97. O Albany 1895-98.
75 *cents a vol.*

[illegible] reports formed part of the general University reports, known as [illegible]. They cover courses of study in secondary schools, [illegible] of professional and business students, licensing examinations for dentists, veterinary surgeons and certified public accountants [illegible]

[illegible] reports and bulletins were discontinued and replaced by [illegible] college and high school departments into which the examination [illegible] was reorganized

ion bulletins University of the State of New York. Ex
ion dep't Bulletins O Albany 1893-98. *Price to ad*
subscribers 50 cents a year.

inations 1) Regents examinations [illegible]p. Nov. 1890.
[illegible] *cents.*

[illegible], laws, ordinances and rules pertaining to all examinations by the regents, details as to all University credentials, [illegible] places of examinations 1891-95, notes on the [illegible] of

inations 2) Academic syllabus. 174p. Ap. 1891 *Re*
by X8

inations 3) Medical syllabus 30p. Oct. 1892 *Replaced*

inations 4) Law syllabus 120p Mar. 1893 *Out of print*
[illegible] covered by examinations for the regents degree of bac[illegible] of [illegible]

inations 5) Report of examination department 1893 [illegible]p.
[illegible]. *Price 10 cents*

[illegible] of examination department 1894. 126p. Mar 1895. *Price 15 c*
[illegible] syllabus 128p. Mar. 1895. *Price 25 cents*

[illegible] covered by state [illegible] examinations, prepared [illegible] state boards of medical examiners [illegible] of candidates

[illegible] syllabus 224p. June 1895. *Replaced by* X24.

[illegible] study and drawing 320. 32pl *Price 25 cents.*
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[illegible] of examination department 1895. 108p Feb 1896 *Price 15 c*
[illegible]ination papers 1896 502p Oct. 1896. *Price 50 cents*
uniform with previous volumes, [illegible]
[illegible] papers.

[illegible], W. M. (Harvard) State map of New York [illegible]
study of geography. 28p. Nov. 1896 *Price 5 cents*
[illegible] map in preparation [illegible]

[illegible]rt of examination department 1896 [illegible]p Jan 1897 *Price 15 c*
[illegible] entrance English 148p. June 1897 *Price 15 cents*
[illegible] entrance [illegible] of representative colleges and [illegible] and methods in teaching [illegible] English

[illegible]ination papers 1897. 778p. Aug. 1897. *Price* [illegible]
[illegible]rt of examination department 1897 [illegible]p. Nov. 1897. *Price 15 c*
[illegible]ination papers 1898. 512p. Sep 1898 *Price* [illegible]
[illegible] contains only the academic papers, the professional papers [illegible] separately as college bulletin [illegible]

High school department reports. University of the [illegible] York. High school dept. Annual report [illegible] [illegible]. *Price 75 cents* [illegible]

High school department bulletins. University of the [illegible] York. High school dept. Bulletins. [illegible] Albany 189[illegible] *[illegible] subscription 50 cents a year.*

X17 (High school 1) Report of high school departmen[t] 189[illegible] [illegible] *Price 15 cents.*

X18 (High school 2) State science teachers associati[on] [illegible] of the third annual meeting, Dec. 1898. [illegible] *Out of print.*

X19 (High school 3) Associated academic principals [illegible] of the [illegible] annual conference, Dec. 1898. [illegible] *Price 25 cents.*

X20 (High school 4) Academic examination papers [illegible] Dec. 1899. *Price 25 cents; [illegible] size, [illegible]*

X21 (High school 5) Report of high school departm[ent] Feb. 1900. *Price 10 cents.*

X22 (High school 6) Associated academic principals [illegible] of the 15th annual conference, Dec. 1899. [illegible] *Price 10 cents.*

X23 (High school 7) State science teachers associatio[n] of the fourth annual meeting, Dec. 1899. [illegible] *Price 35 cents.*

X24 (High school 8) Academic syllabus. [illegible] A[illegible] 25 cents; cloth 50 cents.

[illegible]

X25 (High school 9) Manual training syllabus. [illegible] *Price 10 cents.*

X26 (High school 10) Academic examination papers [illegible] Aug. 1900. *Price, see X30*

X27 (High school 11) Report of high school departmen[t] Feb. 1901. *Price 5 cents.*

X28 (High school 12) Associated academic principals [illegible] of the 16th annual conference, Dec. [illegible] 1901. *Price 25 cents.*

X29 (High school 13) State science teachers associatio[n] [illegible] of the fifth annual meeting, Dec. 1900. [illegible] *Price 35 cents.*

X30 (High school 14) Academic examination papers [illegible] August 1901. *Price see X2[illegible]*

Question papers. University of the State of New York [illegible] dept. Examination papers, for the academic year [illegible] 1893 v. 2; 1894 v. 3; 1895 v. 4; [illegible] *Price in boards, 50 cents a volume; in paper, 25 cents.*

See also X10, X14, X18, X20, X23 and X30. [illegible]

University of the State of New York

High School Department

INCLUDING ACADEMIES AND ALL INTERESTS OF SECONDARY EDUCATION

Bulletin 15 January 1902

DIRECTOR'S REPORT 1901

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K Summary [illegible]	r18
L Names [illegible]	r19
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ALBANY

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1901

University of the State of New York

University of the State of New York

High School Department

INCLUDING ACADEMIES AND ALL INTERESTS OF SECONDARY EDUCATION

Bulletin 15 January 1902

DIRECTOR'S REPORT 1901

To the Regents of the University of the State of New York

The following report of the high school department for the year ending June 30, 1901,[1] was prepared under my direction by Head inspector Charles F. Wheelock.

Scope. This department includes academies, placed under the regents in 1784, and academic departments of union schools under their supervision by the original union free school act of 1853, with other interests of secondary education.

STATISTICS OF SECONDARY SCHOOLS

Growth. Oct. 1, 1901, there were on the University roll 595 academic departments of public schools and 146 chartered academies, making a total of 741 institutions of secondary education, being an increase of 36 over the number reported in 1900. During the year 35 academic departments have been admitted; five previously on the roll, viz, Corona, Rockaway Beach, Wood Haven, Rockton, and Brooklyn (Allegany co.) have been consolidated with others and one, Rondout no. 3, recently admitted on affidavit that a union school had been formed, was dropped when technical defects in that formation were discovered.

During the year the number of full high schools has increased 14, of senior schools 6, and of junior schools 13; the number of schools of middle grade shows a decrease of 3. As 33 of the 35 schools admitted during the year were of junior grade, it appears that the total advancement in grade during the year as a result of increased

[1] All statistics in this report unless otherwise specified are for the year ending June 30, 1901, but later information is given in various places up to Jan. 1, 1902, when copy was sent to the printer.

and improved equipment, additions to teaching force, and extension of courses of study is equivalent to the passing of 14 schools from junior grade to full high school grade, and of 6 schools from junior grade to senior grade.

In 1901 seven academies have been incorporated with permanent charters. Of those regularly on the roll last year, the Clinton Liberal institute, whose building was burned, has been removed to Canton N. Y., where it will carry on its educational work in conjunction with St Lawrence university; Fairfield seminary and St Austin's school are reported closed; Ives seminary at Antwerp, Lansingburg academy, and Round Lake academy have become under approved leases the academic departments of the union school districts in which they are respectively located.

Expenditures. In 1900 the total expenditures of 565 high schools amounted to $4,077,420.55, or $60.92 for each student instructed. In 1901 the amount expended by 595 high schools was $3,596,673.78, an average of $50.97 for each student, a decrease of $9.95.

In 1900 the 140 academies expended $2,018,953.86, or $158.70 for each student. In 1901 the 146 academies expended $2,106,043.74, or an average of $154.45 for each student, a decrease of $4.25.

The expenditures of all secondary schools taken together were $76.81 for each student in 1900 and $68.05 in 1901, a decrease of $8.76.

Students. The number of students instructed in the secondary schools of the state in 1901 was 83,796, an increase of 4431 or 5.6% over the preceding year. It is interesting to note in this connection that the number of boys has increased 5.98% and of the girls 5.28%, which indicates at least a temporary change in the tendency that has prevailed for some years.

The whole number of graduates holding four year or higher credentials is 6403, an increase of 1203 or 23.13% over the preceding year. The whole number of graduates is about 7.6% of the whole number attending and indicates therefore that over 30% of all the students attending secondary schools in the University complete four year courses of study.

The number of advanced diplomas and certificates issued was 2269, an increase of 14½% over the preceding year.

The table of academic credentials issued from 1896 to 1901 inclusive shows several interesting facts. The number of preliminary certificates issued decreased in 1897, showed a very small gain in 1899 and decreased again in 1901. There were marked increases in 1896, 1898 and in 1900. This indicates a biennial period, in the odd year of which there is a falling off or at best a small gain and in the even year a marked increase, for which no satisfactory reason appears. No such fluctuation is apparent in the numbers of other credentials, all of which show a constant and healthy growth. The unusual increase in the number of first year certificates is doubtless due to the dropping of specific requirements previously made for this credential.

The whole number of academic diplomas and fourth year certificates issued in 1901 was 4134, which is 32% of the number of preliminary certificates issued in 1897. This indicates that about one third of all the students who entered the high schools of this state in 1897, completed satisfactorily a high school course of four years and graduated in 1901. This estimate derives added interest from the fact that, though much larger than those commonly given, it is based on data that are absolutely correct.

In the high school report of 1900 attention was called to the pressing problem of providing free academic instruction to pupils not living within districts where high schools are maintained. It is gratifying to be able to report that there are evidences of progress in the direction of a solution, though but little has been accomplished as yet. The logical solution would seem to be in building up larger school districts around established centers of population till practically the entire territory of the state is included in such larger districts. Such an organization would have all the advantages of the township system, while avoiding its most objectionable features. The school commissioners of Madison county have shown what may be done in this direction by persistent effort, and it is earnestly hoped that the movement may extend, for it seems the most promising method of curing the evil that has been proposed.

Examinations. Owing to a change in the method of apportionment, it was expected by many that there would be a large falling off in the volume of the examination work for 1900–1; the table,

however, shows that 410,948 academic examination papers were rated by the University during the year, a larger number than ever before.

The number of candidates entering the academic examinations in New York city has so increased that available accommodations have been severely taxed. The number of rejected papers from these examinations indicates that a large proportion of the candidates have entered the tests without proper preparation, and have thus entailed on the University much unnecessary work. Under these circumstances it has seemed only just to make a nominal charge for admission, and a fee has been fixed of 25c for a single session or $1 for all the sessions of the week. This fee is not large enough to debar any who need to take these examinations and are prepared to do so, but it is hoped that it will relieve the department from the necessity of handling a large mass of poor work, written out of mere curiosity or with a feeling that by some chance one poorly prepared may possibly get through.

Grants to secondary schools. Almost from the organization of the state government it has acted on the theory that one of the duties of the state is to foster and aid secondary and higher education. As early as 1786, when the land office was established, the law directed that the surveyor general in every township of unoccupied lands which he laid out should set apart and mark on his map one lot of 640 acres for "Gospel and schools" and one lot for promoting literature. The establishment of the literature fund in 1790, the successive additions to it in 1813, 1819 and 1827, the application since 1838 of a large part of the income of the United States deposit fund to the same purpose and finally the enactment of the Horton law in 1895 and its amendment in 1901 indicate the fixed policy of the state for over a century, a policy that has been so fruitful in results that New York's organization for secondary education is recognized as being without a rival. More schools, better attendance, better teaching can not be had without increased cost; but is there any other way in which money can be expended by the state with the hope of greater return?

The amounts apportioned to secondary schools in the University for the fiscal year ending Sep. 30, 1900, were as follows:

For credentials (1898–99)	$119 860	..
For $100 quota (1899–1900)	58 700	..
For attendance (1899–1900)	69·499	40
[1] For books and apparatus (1900–1)	44 252	51
	$292 311	91
To this should be added cost of inspection, travel and incidental expenses (1899–1900)	44 055	09
	$336 367	..

The corresponding apportionments for 1901 were as follows:

For credentials (1899-1900)	$138 545	..
For $100 quota (1900-1)	61 900	..
For attendance (1900-1)	76 589	72
	$277 034	72
To this should be added cost of inspection, travel and incidental expenses (1900-1)	37 738	..
	$314 772	72
This leaves for grants for books and apparatus to be paid monthly between Oct. 1, 1901, and Sep. 30, 1902	35 227	28
	$350 000	..

INSPECTION

Head inspector Charles F. Wheelock submits the following report for the academic year 1900-1.

Dr E. J. Peck of Owego was added to the staff of inspectors Jan. 3, 1901, and some assistance has been rendered, as in former years, by other members of the University staff, thus enabling those engaged in the preparation of question papers to keep in actual touch with the schools.

A tabular statement of the number of inspections made by each inspector and a list of addresses made by each are given in the appendix as Table K [p. r16]. The total number of inspections was 1415. Each institution in the University was visited at least once, and many more than once.

Approval of laboratory courses. In a circular to principals the following announcement was made in regard to courses in physics, chemistry, botany and zoology.

1 Made between Oct. 1, 1900, and Sep. 30, 1901.

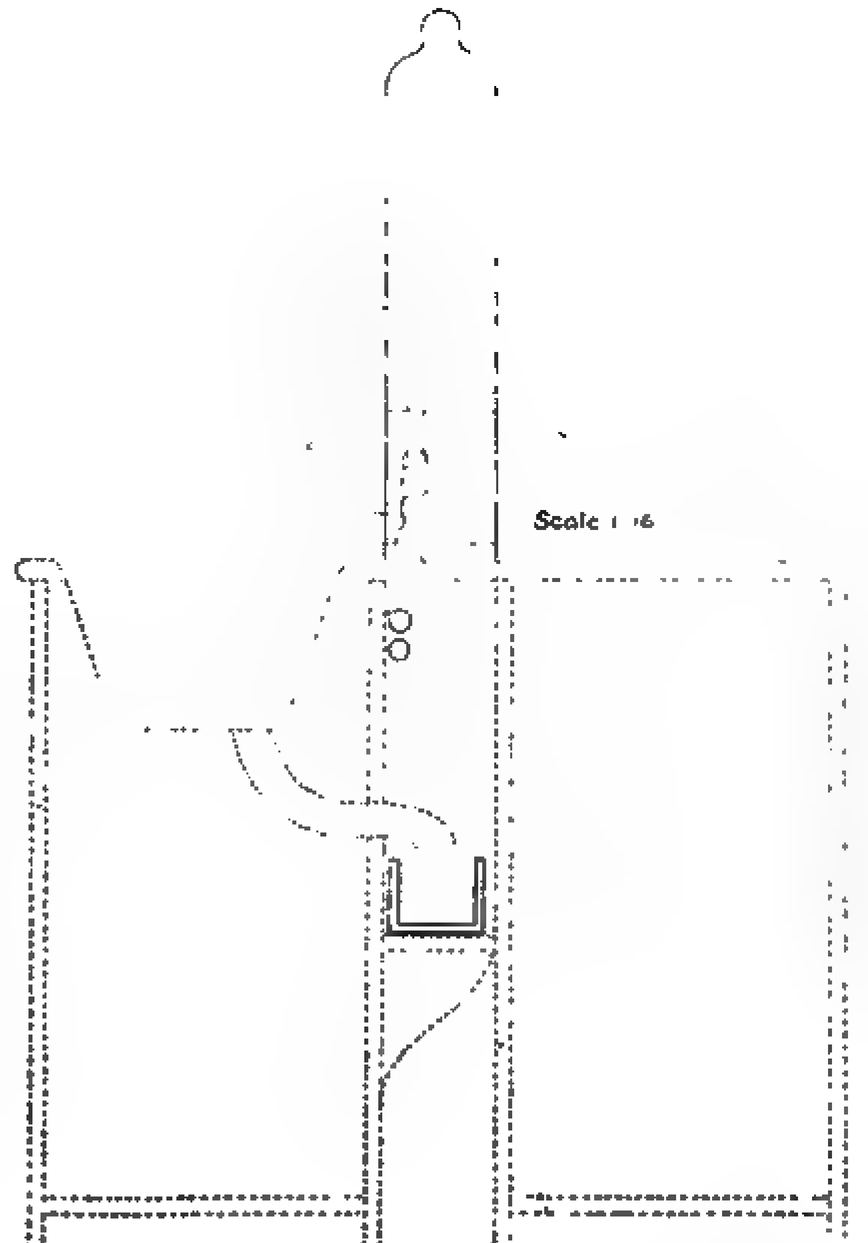
A laboratory course previously approved by an inspector, with notebook certified by the principal, may receive 20 credits toward the examination, in which case only eight questions are to be answered. An approved laboratory course must consist of at least 70 exercises a year, 35 a half year, of at least 40 minutes each, and the school must provide adequate facilities and supervision for individual work. Schools wishing their laboratory courses approved should file as early as possible a request to that effect.

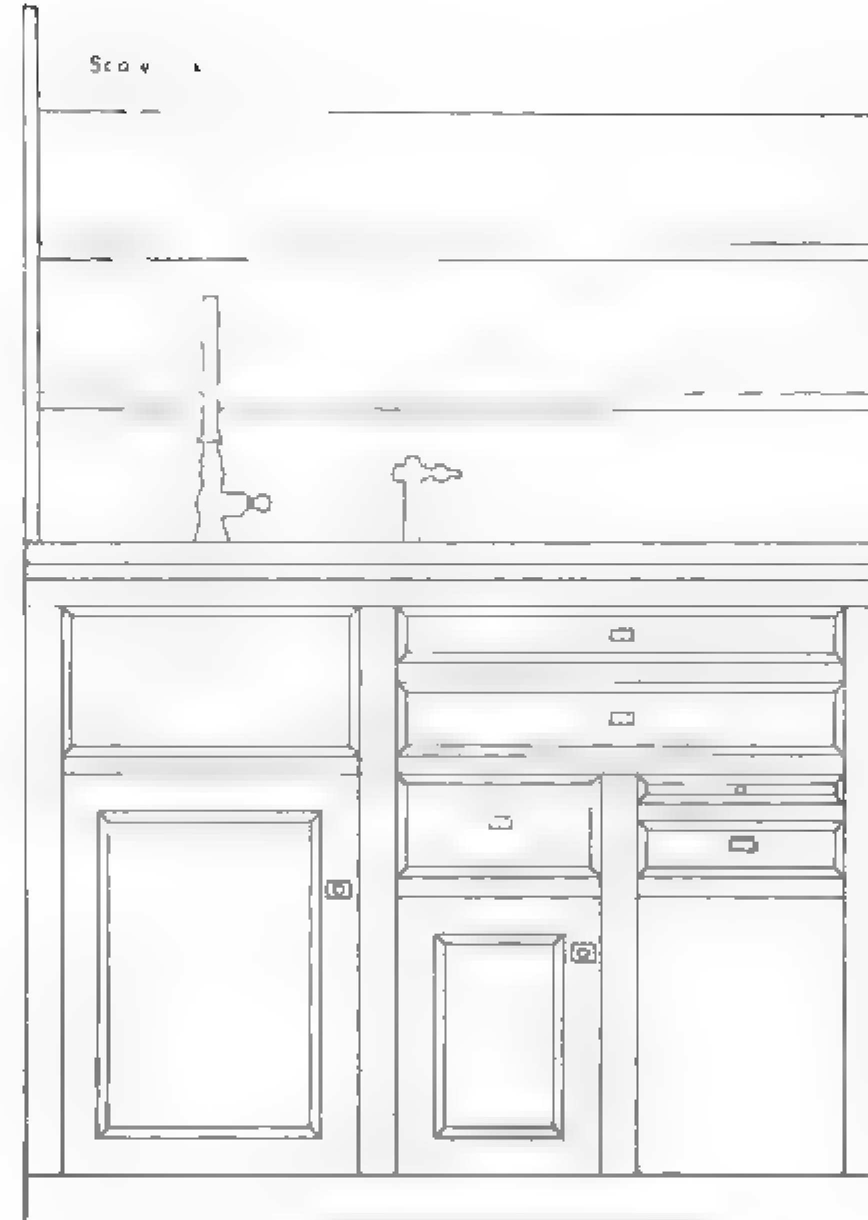
Following this announcement requests were received for the approval of 237 courses, as follows: 91 in physics, 87 in chemistry, 34 in botany and 25 in zoology. Special visits for the purpose of considering these courses were made, principally by Inspector Cobb for physics and chemistry, and by Inspector Clement for botany and zoology. As a result, approval was given to 65 courses in physics, 71 in chemistry, 27 in botany and 17 in zoology, or 180 in all.

This is the beginning of a movement that promises to result in an important advance in science teaching in this state. The number of students electing physics and chemistry has largely increased, 19% in the former and 39% in the latter, but it is believed that the value of the work done has increased in a much larger ratio.

For the assistance of those who may wish to fit up laboratories the following elevation, section with projection, and perspective of a chemical desk are given. The sink may be of cast iron having a brass stopper and chain. The waste pipe is of lead 2 inches in diameter. The trough into which the waste pipes discharge extends the entire length of the desk and has a fall of 1 inch in 2 feet to give free discharge through an outlet at one end into the 4 inch cast iron waste pipe under the floor. This trough is best made of 6 pound sheet lead in which case it will need no support on the sides, and may be placed directly on the shelf supported by brackets as shown in the section. It is to be observed that all gas fitting and plumbing except the sinks and short waste pipes are placed in the center which is a part of the left half as shown in the section. The right half is thus entirely free to be moved away to expose the gas fitting and plumbing.

From the perspective, which is that of one row of desks in the chemical laboratory of the state normal school at Oneonta, it may be seen that the second drawer above the waste jars is replaced by a


Scale


Scale

slide which is used as a seat, thus avoiding the use of chairs or stools in the laboratory.

For physics a common, heavy table about 36 inches high is most suitable. The top should be at least 1½ inches thick, and should project at sides and ends at least 4 inches beyond the rails to admit the free use of clamps. It is desirable that there should be uprights at the ends to support a horizontal bar adjustable for hight. This bar is to support pulleys, pendulums and similar apparatus. Iron should not be used in the construction of this table as it will render uncertain the results in electrical experiments.

If gas is to be used on the table a pipe may be fastened to a board and placed on the center of the table when wished and then removed, the connection being made by rubber tubing with the fixture overhead or elsewhere. Running water should be provided in the room.

For zoology and botany ordinary tables (30 inches high) and chairs should be provided. Running water and means of producing heat are needed.

School apparatus. As a direct result of the giving of credit for approved laboratory courses there has been an unusual increase in laboratory equipment, and an unusual demand for the services of Inspector Gibson and his assistant, who have visited 236 different schools during the year. The increase in equipment has, of course, been largely along the line of furnishing facilities for individual laboratory work. To aid teachers in this particular direction, a list of articles needed to perform the experiments in physics recommended by the New York state science teachers association and published in the *Academic syllabus*, has been prepared by the apparatus inspectors and is given in Table O [p. r26] of the appendix. While in the main the purchases of school apparatus have shown good judgment, the number of applications for duplication for the purchase of expensive pieces of apparatus that are excellent for some special purpose but have limited use in the school seems to make a word of caution necessary. The pieces referred to are usually patented articles which are listed at prices far in advance of the cost of manufacture, and which are sold almost exclusively by direct solicitation. As a rule such pieces are used a few times while they are new and after that serve simply to occupy space in storerooms. There is a question as to whether the state should be asked to pay one half the cost of such pieces in any event, and specially when

the school is not well equipped in more important particulars. In no case should any school agree to buy any apparatus on the assumption that the state will duplicate the money so expended, till application has been made and approval obtained.

SUMMARY OF APPENDIX

For the convenience of the reader the tables and some other information have been transferred to the appendix. These are described briefly as follows:

A Comparative table of secondary schools.

B Secondary schools in the University. Teachers, students, net property and expenditures.

C Analysis of expenditures.

D Students in secondary schools. The number in schools of each grade and class.

E Credentials issued in 1901.

F Academic examinations in 1901.

G Summary of criticisms of question papers since 1893.

H Calendar of academic examinations.

I Grading of schools, showing the number in each grade and the changes since 1896.

J Showing advance in grade of the schools admitted each year since 1893, when the schools were first graded.

K Summary of inspections, showing total number of visits made, to which is added a list of addresses given by each inspector.

L List of institutions whose names were changed in 1901.

M Summary of secondary schools chartered or admitted to the University in 1901. Permanent charters were granted to seven academies, and certificates of admission were issued to 35 academic departments. The total net property of these institutions was $953,464.97, the average net property $23,836.62.

N Preliminary and academic studies table.

O Apparatus needed to perform the experiments in physics recommended by the New York state science teachers association.

Respectfully submitted

James Russell Parsons jr

Regents office, Albany N. Y. *Director*

1 Jan. 1902

APPENDIX

A Comparative table of secondary schools

	1870	1875	1880	1885	1890	1895	1896	1897	1898	1899	1900	1901
High schools	62	121	153	191	231	373	421	465	514	541	565	595
Academies	125	107	86	79	104	131	128	119	131	134	140	146
Total	187	228	239	270	335	504	549	584	645	675	705	741

B Secondary schools in the University 1901

Classification	Number	Faculty		Students in attendance			Net property	Expenditures
	1901	Men	Women	Boys	Girls	Total		
High schools	595	1 095	3 876	30 360	40 200	70 560	$10 738 383 27	$3 596 673 78
Academies	146	524	1 207	5 988	7 648	13 636	19 810 629 33	2 106 043 74
Total	741	1 619	5 083	a36 143	a47 653	a83 796	$30 549 012 60	$5 702 717 52

C Analysis of expenditures

	High schools	Academies
1 Grounds	$151 549 32	$87 612 57
2 Buildings	335 552 68	340 901 63
3 Furniture	44 981 75	28 924 94
4 Apparatus	58 421 01	19 407 15
5 Libraries	49 433 57	9 110 67
6 Salaries for instruction	2 290 506 57	661 759 21
7 Paid other officers and employees	161 984 31	120 769 53
8 Prizes, scholarships, etc	1 409 23	18 384 94
9 Given or lent to students	....	37 789 73
10 Interest on debts	45 511 84	84 710 31
11 Insurance	11 284 37	14 920 17
12 Fuel and lights	108 080 58	85 387 92
13 Other incidentals	39 993 16	25 731 26
14 All other purposes	297 965 39	570 633 71
Total	$3 596 673 78	$2 106 043 74

a Excluding those duplicated. 205 boys and 195 girls of Binghamton high school are also students of Barlow school of industrial arts.

D Students in secondary schools

	No. 1 Oct. 1901	Boys	Girls
High schools			
High schools	361	27 012	36 145
Senior "	39	721	869
Middle "	57	901	1 048
Junior "	136	1 676	2 102
*a*Special "	2	50	36
Total	595	30 360	40 200
Academies			
Academies	*d*108	4 025	4 891
Senior academic schools	2	38	111
Middle "	11	187	291
Junior "	*e*21	514	276
*b*Below grade	*e*1	35	....
*c*Special	3	1 189	2 079
Total	146	5 988	7 648
Grand total	741	*f*36 143	*f*47 653
		*f*83 796	

E Credentials issued in 1901

Preliminary certificates	17 821
1st year "	14 145
2d " "	7 377
3d " "	5 845
4th " "	72
Advanced certificates	49
Diplomas	4 062
Advanced diplomas	2 220

a New York institution for the blind, New York and New York state school for the blind, Batavia.

b St Austin's school, West New Brighton.

c Barlow school of industrial arts, Binghamton, Hebrew free school, Syracuse, and Rochester Atheneum and mechanics institute.

d Not including Clinton Liberal institute, which was not in session last year, and including Fairfield seminary and Temple Grove seminary, which were permanently closed in June. Lansingburg academy, which became the academic department of Lansingburg union school after June is also included.

e Including one reporting for this year but closed on Oct. 1.

f Excluding those duplicated. 203 boys and 195 girls of Binghamton high school are also students of Barlow school of industrial arts.

F Academic examinations in 1901

Schools taking examinations	699
Papers written	538 833
Papers claimed	411 039
Papers allowed	353 939
Papers rejected	57 100
Per cent of claimed papers allowed	86
Per cent of papers claimed to total number written	76
Per cent of papers allowed to total number written	66
Per cent of honor papers to total number accepted	21

G Criticism of question papers

	Satisfactory	Too long	Too short	Too difficult	Too easy	
1893	87 %	2.6%	.1%	9.1%	1.2%	100%
1894	91.2	2.3	.1	5.5	.9	100
1895	92.2	1.6	......	5.6	.6	100
1896	91.2	1.5	.....	6.9	.4	100
1897	88.1	4	......	7.4	.5	100
1898	92.9	1.4	......	5.5	.2	100
1899	92.5	1.4	......	5.7	.4	100
1900	94.7	1	......	3.9	.3	100
1901	93.9	1.4	......	4.6	.1	100

H Calendar of academic examinations

DATES	PLACE	SUBJECTS
1900		
Aug. 17-18	Chautauqua	8 academic
1901		
Jan. 21-25	688 secondary schools	81 "
Mar. 27-29	660 "	30 "
June 17-21	694 "	84 "

I Grading of schools

	ACADEMIES							ACADEMIC DEPARTMENTS							TOTAL						
	Acad.	Sr acad.	Mid. acad.	Jr acad.	Below grade	Special	Total	H. S.	Sr	Mid.	Jr	Below grade	d Special	Total	H. S.	Sr	Mid.	Jr	Below grade	Special	Total
Jan. 1, 1896	86	7	6	18	7	....	124	125	19	36	106	9	2	297	211	26	42	124	16	2	421
Oct. 21, 1896	87	1	6	24	1	....	119	214	34	43	137	....	2	430	301	35	49	161	1	2	549
June 30, 1897	90	2	6	20	1	....	119	247	26	50	140	....	2	465	337	28	56	160	1	2	584
Dec. 22, 1897	92	2	7	21	1	....	123	253	24	51	158	....	2	488	345	26	58	179	1	2	611
June 30, 1898	99	3	8	19	1	a1	131	267	24	61	160	....	2	514	366	27	69	179	1	3	645
Dec. 16, 1898	98	4	9	18	1	a1	131	279	28	67	146	....	2	522	377	32	76	164	1	3	653
Nov. 17, 1899	103	4	8	16	1	b1	133	311	30	61	137	....	2	541	414	34	69	153	1	3	674
Nov. 9, 1900	106	4	11	17	1	c3	142	338	35	63	124	....	2	562	444	39	74	141	1	5	704
Oct. 1, 1901	106	2	11	20	....	c3	142	363	39	57	133	....	2	594	469	41	68	153	....	5	736

a Round Lake summer institute. b Hebrew free school, Syracuse. c Barlow school of ind. arts, Binghamton, Hebrew free school, Syracuse and Rochester Athenaeum and mechanics inst. d Schools for the blind.

J Advance in grade

		Whole number of schools admitted as junior schools since Feb. 1894	Number of such schools now of middle grade	Number of such schools now of senior grade	Number of such schools now of high school grade	Number of such schools still holding junior grade
1893-94	acad.	3	1	....	2	....
	u. s.	14	3	2	7	2
		17	4	2	9	2
1894-95	acad.	5	....	....	2	[illegible]
	u. s.	48	5	10	24	9
		53	5	10	26	12
1895-96	acad.	2	1	....	[illegible]	....
	u. s.	41	10	6	16	9
		43	11	6	17	9
1896-97	acad.	....	....	....	....	....
	u. s.	32	8	6	12	7
		32	8	6	12	7
1897-98	acad.	2	1	....	1	....
	u. s.	42	[illegible]	3	7	27
		44	6	3	8	27
1898-99	acad.	2	....	....	....	2
	u. s.	24	5	....	2	17
		26	5	....	2	19
1899-1900	acad.	3	....	....	....	3
	u. s.	23	1	....	....	22
		26	1	....	....	25
1900-1	acad.	5	....	....	....	5
	u. s.	32	....	....	....	32
		37	....	....	....	37
Grand total	acad.	22	3	....	6	13
	u. s.	256	37	26	68	125
		278	40	26	74	138

K Summary of inspections 1900

Inspector	High schools	Academies	Colleges	Professional and special schools	Universities	Registered private schools	Special corporations	Business schools	Miscellaneous schools not in University	Libraries and museums	Total
C. F. Wheelock	11	4	1	......	......	......	1	......	1	......	18
C. N. Cobb	94	56	4	1	1	6	6	......	16	......	185
A. G. Clement	111	17	......	1	......	......	......	......	1	......	130
Charles Davidson	78	10	......	......	......	......	......	......	......	......	88
E. W. Lyttle	126	21	2	1	......	......	......	......	......	......	150
S. D. Arms	145	40	9	13	1	......	1	......	[illegible]	......	213
E. J. Peck	70	9	2	1	......	......	......	......	......	......	[illegible]
E. S. Frisbee	70	24	3	1	1	1	......	......	......	......	100
W. R. Eastman	......	......	......	......	......	......	......	......	......	a 144	144
L. O. Crissey	9	2	......	......	......	......	......	31	......	......	42
J. H. Gibson	106	9	......	......	......	......	......	......	......	......	115
F. M. Baker	111	9	......	1	......	......	......	......	......	......	121
Other members of staff	5	2	......	6	3	......	......	......	......	11	27
	936	205	21	25	6	7	7	31	22	155	b 1415

Educational meetings. In addition to these visits to institutions the inspectors have attended and taken part in the exercises of educational meetings as follows.

Charles F. Wheelock

1900		
Sep.	6	Newburgh, school commissioners association
Oct.	4	Batavia, teachers institute
Oct.	8-9	Amityville L. I., teachers association
Oct.	13	Gloversville, Tricounty council
Oct.	16	Sandyhill, teachers institute
Oct.	17-18	New York, council of superintendents
Oct.	26-27	Worcester, Otsego co. council
Nov.	16	Albany, Hudson River schoolmasters club
Nov.	30	Philadelphia Pa., Association of colleges and preparatory schools of the Middle states and Maryland
Dec.	4	Kingston, teachers institute
Dec.	14	Gloversville, city association
Dec.	21	Canajoharie, teachers institute
Dec.	26-27	Syracuse, Associated academic principals
Dec.	28-29	Rochester, New York state science teachers association

a Including 19 not in University.
b An increase of 100 over 1900.

1901		
Feb.	7	New Paltz normal school, address
Feb.	15	New York, New York state art teachers assoc
Feb.	22	Gouverneur, teachers association
Feb. Mar.	27 1	Chicago Ill., department of superintendence
Mar.	9	Syracuse, principals council of Onondaga co.
Ap.	4	Marion, Wayne co. association
Ap.	10	Avon, Livingston co. association
May	10	Canajoharie, Montgomery co. association
May	25	Rochester, Monroe co. association
May	31	Dunkirk, Chautauqua co. association
June	24	Watervliet, commencement
June	24	Poughkeepsie, commencement
June	25	Roundlake, commencement
June	27	Whiteplains, commencement
July	5	Saratoga, American institute of instruction

Charles N. Cobb

1900		
)ct.	13-14	Newburgh, Schoolmasters club of the Highlands
'ct.	17-19	New York, council of city and village superintenden
ov.	16-17	Albany, Hudson River schoolmasters club
ɔv. 'c.	30 1	Philadelphia Pa., Association of colleges and prepa atory schools of the Middle states and Maryland
c.	27	Syracuse, Associated academic principals
:.	28-29	Rochester, New York state science teachers associatio
!901		
	16	Watertown, principals association of Jefferson an Lewis counties
	12-13	Herkimer, Tricounty council
	24	Cornwall on the Hudson, commencement
	26	Worcester, commencement
	27	Ballston, commencement
	5-6	Buffalo, New York state teachers association
	8-12	Detroit Mich., National educational association
	12	Lakewood, association of commissioners and superi tendents

A. G. Clement

1901		
Feb.	25	Ypsilanti Mich., normal class
June	21	Schuylerville, commencement
June	24	Painted Post, commencement
June	25	Silvercreek, commencement
June	27	Johnstown, alumni reunion

Charles Davidson

1900		
Oct.	12	Rutland Vt., state teachers association
Nov.	10	Potsdam, St Lawrence co., schoolmasters club
Nov.	17	Canandaigua, Ontario co. association
Dec.	8	Malone, Franklin co. association
1901		
June	21	Ponckhockie, commencement
June	24	Amsterdam, commencement

Eugene W. Lyttle

1900		
Oct.	20	Warrensburg, semiannual meeting of the Warren co teachers association
Nov.	22	Mexico, teachers institute
1901		
Feb.	16	Tappan, Rockland co. teachers association
Feb.	21	Watervliet, teachers meeting
Feb.	23	Jamestown, principals conference
May	9-11	Hanover N. H., conference of teachers of history in secondary schools

S. Dwight Arms

1900		
Oct.	27	Phelps, Ontario co. teachers association, 1st district
Nov.	16	Canandaigua, Ontario co. teachers association, 2d district
Dec.	26-28	Syracuse, Associated academic principals
1901		
Feb.	9	Holley, Orleans co. teachers association
Ap.	20	Batavia, Genesee co. teachers association
May	10	Mount Morris, Livingston co. teachers ass'n, 2d dist
May	18	Canajoharie, Montgomery co. teachers association

June	24	Williamsville, commencement
June	25	Bergen, commencement
June	26	Prattsburg, commencement
June	27	Olean, high school alumni association
July	5-6	Buffalo, state teachers association
July	8-12	Detroit Mich., National educational association
Aug.	2	Meridian, district meeting

I. O. Crissy

1900		
Oct.	18-20	New York, council of superintendents
Dec.	1	New York, commercial teachers association
Dec.	27-29	Detroit Mich., National commercial teachers federation
1901		
Feb.	16	New York, meeting of male teachers of the city
Ap.	20	Albany, Hudson River schoolmasters club
May	4	New York, meeting of joint committees on business education of state teachers association
May	4	New York, state association of business schools
May	10	Watervliet, meeting of parents, teachers and high school students
May	18	Saratoga, county teachers association
June	7	Huntington, conference on business education
July	9-12	Detroit Mich., National educational association

L Names changed in 1901

From	To	Date
Burstone union school (acad. dep't)	New York Mills union school no. 2	20 D 00
Haverling union school "	Haverling high school..........	14 Mr 01
McGraw union school "	McGrawville union school.......	20 D 00
Piermont union school "	Tappan Zee high school.........	20 D 00
Sag Harbor union school (acad. dep't)........................	Sag Harbor high school.........	14 Mr 01
St Teresa's Ursuline acad. (N.Y.).	Ursuline academy	20 D 00
Sing Sing high school............	Ossining high school...........	1 Jl 01

20 D 00, Regents approved of the action of the school board of the boroughs of Manhattan and the Bronx in changing the names of the New York boys high school, New York girls high school and New York mixed high school to DeWitt Clinton high school, Wadleigh high school, and Peter Cooper high school respectively.

M Teaching

Summary of charters

NAME	Postoffice	County	Date	Grade	b Inspector
Permanent charters					
a Berkeley school	New York	New York	14 Mr 01	acad.	C
Hackley school	Tarrytown	Westchester	20 D 00	j. a.	"
St Ann's academic school of Nyack	Nyack	Rockland	14 Mr 01	"	"
St Augustine s academic school	Troy	Rensselaer	1 Jl 01	"	"
St John s academic school of Goshen	Goshen	Orange	20 D 00	"	Cl
St Mary's academy of Hudson	Hudson	Columbia	"	acad.	F
Ursuline academic school	Middletown	Orange	1 Jl 01	j. a.	Cl
High schools and academic departments admitted					
Altamont union school	Altamont	Albany	1 Jl 01	j.	C
Antwerp high school	Antwerp	Jefferson	"	h. s.	L
Bradford union school	Bradford	Steuben	20 D 00	j.	Cl
Brier Hill union school	Brierhill	St Lawrence	14 Mr 01	"	L
Castleton union school	Castleton	Rensselaer	"	"	F
Center Moriches union school	Center Moriches	Suffolk	20 D 00	"	C
Chautauqua union school	Chautauqua	Chautauqua	"	"	Cl
Chenango Forks union school	Chenango Forks	Broome	"	"	D
Commercial high school	Brooklyn	Kings	1 Jl 01	h. s.	C
De Kalb Junction union school	De Kalb Junction	St Lawrence	20 D 00	j.	L
Despatch union school	Despatch	Monroe	14 Mr 01	"	A
East Rockaway union school	East Rockaway	Nassau	1 Jl 01	"	C
Eastern district high school	Brooklyn	Kings	14 Mr 01	h. s.	"
Easton union school	Easton	Washington	20 D 00	j.	F
Ellenburg Depot union school	Ellenburg Depot	Clinton	14 Mr 01	"	L
Erieville union school	Erieville	Madison	"	"	D
Fraser union school	Hastings upon H.	Westchester	1 Jl 01	"	C
Gardenville union school	Gardenville	Erie	20 D 00	"	A
Guilford union school	Guilford	Chenango	"	"	D
Harrisville union school	Harrisville	Lewis	"	"	L
Hyde Park union school	Hydepark	Dutchess	"	"	F
Jefferson union school	Jefferson	Schoharie	14 Mr 01	"	Cl
Napanoch union school	Napanoch	Ulster	"	"	"
Nelsonville union school	Nelsonville	Putnam	"	"	C
Oakdale union school	Oakdale Station	Suffolk	20 D 00	"	"
Oswego Falls union school	Oswego Falls	Oswego	"	"	L
Port Washington union school	Port Washington	Nassau	1 Jl 01	"	C
Potsdam union school	Potsdam	St Lawrence	"	"	L
a Rondout union school	Rondout	Ulster	"	"	Cl
Rowena memorial school	Palenville	Greene	"	"	D
Rye union school	Rye	Westchester	20 D 00	"	C
Sloan union school	Sloan	Erie	14 Mr 01	"	A
Warner union school	Warner	Onondaga	1 Jl 01	"	"
Windham union school	Windham	Greene	14 Mr 01	"	F
Youngstown union school	Youngstown	Niagara	20 D 00	"	A
Total					
Average					

a Charter or certificate of admission not issued at time of making this report. *b* A=S. Dwight Arms; C=Charles N. Cobb; Cl=Arthur G. Clement; D=Charles Davidson; F=Edward S. Frisbee; L=Eugene W. Lyttle.

Rockton union school. 1 Jl 01. Board of education of Amsterdam authorized after Aug. 1, 1901, to consolidate the academic dep't of Rockton union school with Amsterdam high school and to make such transfer of its books and apparatus as in their judgment may seem best. *Clinton Liberal institute.* 1 Jl 01. On receipt of the unanimous request of the trustees of Clinton Liberal institute, Fort Plain, permission be given to said institution to remove to Canton to carry on its work in conjunction with St Lawrence university. Unanimous request not received at time of making this report.

institutions

and admissions 1901

VALUE OF							Debts	Net Property
Grounds	Buildings	Furniture	Library	Apparatus	Museum	Other property		
$350 000 ..	$175 000 ..	$6 000 ..	$3 000 ..	$5 000 ..	....	$16 433 ..	$270 000 ..	$285 433 ..
?	de125 000 ..	?	200 ..	100 .	......	e37 000	....	162 800 .
3 000 ..	16 000 .	600 ..	200 ..	f500 ..	....	....	.. ..	p20 400 ..
4 000 .	54 000 ..	2 100 ..	?200 ..	?121 20	......	. ... ..	25 000 ..	85 421 20
3 000 .	18 000 ..	686 ..	300 ..	100 ..	......	56 000 ..	12 700 ..	65 280 ..
5 000 ..	50 000 ..	f2 875 .	540 ..	250 ..	....	....	20 000	18 125 ..
20 000 .	10 000 ..	600 ..	201 55	105 .	....	....	... .	20 806 55
800 ..	1 000 .	115 ..	240 80	108 50	......	?	?	1 964 30
?	d40 000 ..	861 10	505 .	700	$300 ..	. ...	....	42 069 10
400 .	1 600 ..	[illegible]	217 73	108 80	......	....	....	2 878 92
200 .	1 696 64	225 ..	200 ..	133	.... .	691 85	2 10	3 042 39
800	3 500 .	540 .	200 ..	116 80	... .	....	... .	5 116 80
1 800 ..	5 000 .	500 .	228 ..	195 .	.....	....	h4 000 .	3 723 ..
1 400	12 000 ..	1 000 ..	202 97	?100 ..	... ..	....	i13 500 ..	1 202 97
800 ..	8 500 ..	300	?200 .	?100 ..	....	500 ..	....	8 400 ..
c	c	c	c	c	c	c	c	c
200 ..	3 000 .	35	200 ..	?100 ..	....	....	.. ..	3 535 ..
1 000 .	9 000 ..	450 ..	200 20	117 .	... .	?1 110 .	j8 100 ..	3 767 20
1 500 ..	9 100 ..	946 ..	228 79	112 20	....	694 80	k9 000 ..	3 476 79
c	c	c	c	c	c	c	c	c
100 ..	5 625 .	190 50	g100 ..	150 .	....	?125 ..	.. . .	6 490 50
500 ..	3 000 ..	375 ..	310 ..	103	43 25	?300 ..	.. ..	4 631 25
125 .	3 000 ..	200 ..	200 .	100 .	....	... .	h3 000 ..	1 725 ..
5 000 ..	18 000 ..	1 000 ..	500 ..	?131 ..	50 ..	.....	.. ..	22 731
1 000 ..	6 000 ..	358 ..	215 10	115 ..	....	30 ..	h2 500 ..	5 208 10
500 ..	3 000 ..	?	214 25	?100 ..	....	600 ..	l4 000	314 25
500 ..	2 400	50 ..	288 55	?100 .	....	565 45	....	3 504 ..
1 000 .	7 000 ..	2 000 ..	300 ..	150 ..	....	72 000	....	12 450 ..
1 000 ..	3 500 .	701 50	200 .	116 20	....	....	m3 700 ..	1 820 70
800 .	2 500 ..	75 ..	?200 ..	?125 ..	....	738 70	100 ..	3 838 70
2 000 .	4 000	155 .	228 40	198 60	. .....	....	....	6 583 90
1 500	4 400 ..	64 .	?200 ..	120 ..	3 ..	135 ..	....	6 423 ..
4 000 ..	15 000 .	400 ..	?200 ..	150 ..	....	30 000 ..	h38 950 ..	10 800 ..
1 600 .	14 000 ..	?1 200	?200 ..	?100 ..	. ..	....	h15 100 ..	3 400 ..
4 443 85	11 647 75	1 367 04	330 ..	222 53	3 ..	?773 75	n1 000 ..	17 806 92
5 000 .	785 000 ..	?1 500 .	g104 19	150 .	....	2 950 ..	n12 000 ..	32 701 19
1 400 ..	50 000 .	?	?200 ..	?100 .	......	....	.. ..	51 600 ..
10 000 ..	20 000 ..	f1 600 ..	614 80	288 25	. .....	9 000 ..	o2 500 ..	37 902 05
2 800 ..	5 000 ..	1 400 .	219 15	103 60	....	2 016 54	....	12 539 29
1 350 ..	12 000 ..	175 ..	?208 ..	139 ..	5 ..	1 500 .	h12 000 ..	3 367 ..
800 .	1 500 ..	379 30	200 .	100 ..	....	... .	h1 500 ..	1 479 30
2 200 ..	8 500 ..	600 ..	249 .	107 50	....	1 058 ..	h2 400 ..	10 508 50
$438 017 85	$756 069 29	$31 132 64	$12 724 97	$11 071 18	$404 25	$165 096 59	$461 052 10	$958 464 97
11 526 79	18 901 78	841 43	318 18	276 78	67 38	7 504 39	20 956 21	23 856 62

c No statement of property given. d Including grounds. e Held in trust by American unitarian association. f Including musical instruments. g Public library completes requirements. h Bonded debt i Including $12,000 bonded debt. j Including $6000 bonded debt. k Including $9500 bonded debt. l Including $2500 bonded debt. m Including $3400 bonded debt. n Including bonded debt. o Including $3000 bonded debt. p Leased.

N Preliminary and academic studies table

	SUBJECTS	STUDENTS' ANSWER PAPERS				
		Examined	Claimed	Allowed	Honor	Percent allowed to no. examined
1	Reading	26 427	25 731	[illegible]	10 021	97
2	Writing	28 182	26 758	26 753	8 289	95
3	Spelling	43 570	31 059	30 220	10 904	69
4	English, elementary	40 404	27 850	20 612	2 151	51
5	Arithmetic	39 686	26 147	24 487	7 298	62
6	Geography	43 804	[illegible]	25 861	3 814	59
7	English, 1st year	6 484	4 575	3 156	225	49
8	Advanced English	18 201	13 085	9 423	495	52
9	English composition	14 578	11 678	8 056	412	55
10	English, 2d year	3 589	3 076	2 189	249	61
11	Rhetoric	8 636	7 166	4 497	231	52
12	American selections	3 493	3 115	2 700	626	75
13	English, 3d year	813	732	542	75	67
14	Advanced Eng. composition	3 718	3 074	1 311	68	35
15	English selections	1 589	1 390	1 161	284	73
16	English reading	3 079	2 696	2 049	375	67
17	Hist. of literature, English	1 556	1 396	998	128	64
18	Hist. of literature, American	1 586	1 492	1 097	153	69
19	Word analysis	285	245	112	4	39
20	Business English	1 044	903	431	27	41
21	German, 1st year	6 977	5 373	4 536	[illegible]	65
22	German, 2d year	3 918	3 221	2 636	305	67
23	German, 3d year	1 324	1 104	936	91	71
24	French, 1st year	3 001	2 502	2 277	328	76
25	French, 2d year	1 780	1 487	1 320	156	74
26	French, 3d year	608	537	466	60	77
27	Spanish, 1st year	107	96	84	28	79
28	Spanish, 2d year	65	62	50	22	77
29	Spanish, 3d year	30	30	23	7	77
30	Latin, 1st year	11 887	8 208	6 885	1 178	58
31	Latin, 2d year	726	632	556	73	77
32	Caesar's Com.	6 361	5 179	4 610	536	72
33	Latin, 3d year	230	226	218	33	95
34	Sallust's Catiline	610	572	537	117	88
35	Cicero's Orations	2 293	2 111	1 934	326	84
36	Virgil's Aeneid	1 682	1 545	1 485	265	88
37	Virgil's Eclogues	316	[illegible]	281	66	89
38	Latin composition	1 623	1 360	1 267	190	78
39	Greek, 1st year	831	710	[illegible]	181	80
40	Greek, 2d year	30	27	21	4	70
41	Xenophon's Anabasis	709	603	576	106	81
42	Homer's Iliad	429	396	392	113	91
43	Greek, 3d year	57	54	51	15	89
44	Greek composition	357	324	309	80	87
45	Advanced arithmetic	2 476	1 617	1 146	112	46
46	Algebra	17 085	12 125	10 [illegible]	3 907	64
47	Advanced algebra	791	548	[illegible]	119	57
48	Plane geometry	11 067	8 070	6 656	[illegible]	[illegible]
49	Solid geometry	1 486	1 290	1 225	496	82
50	Plane trigonometry	499	374	345	[illegible]	[illegible]
51	Spheric trigonometry	281	280	267	65	95
52	Business arithmetic	2 137	1 465	[illegible]	142	[illegible]
53	Astronomy	1 302	1 050	[illegible]	101	[illegible]
54	Physics, part 1	5 079	4 002	3 [illegible]	953	[illegible]

N Preliminary and academic studies table (continued)

	Subjects	Students' answer papers: Examined	Claimed	Allowed	Honor	Per cent allowed to no. examined
55	Physics, part 2	3 215	2 743	2 305	648	72
56	Chemistry, part 1	2 447	2 176	1 996	597	82
57	Chemistry, part 2	1 850	1 763	1 617	515	87
58	Physical geography	12 758	9 237	7 886	863	62
59	Geology	2 787	2 434	2 190	310	79
60	Botany	3 283	2 492	2 108	328	64
61	Zoology	1 793	1 519	1 317	223	73
62	Physiology and hygiene	22 478	16 241	14 552	1 561	65
63	Elemen. U. S. hist. and civics	28 086	20 102	17 046	2 812	61
64	Greek history	5 003	4 299	3 896	1 051	78
65	Roman history	5 776	4 885	4 024	763	70
66	Medieval history	968	888	719	176	74
67	English history	5 747	4 597	3 505	553	61
68	Advanced U. S. history	2 979	2 151	1 374	104	46
69	Civics	13 786	10 542	8 221	1 264	60
70	Economics	5 046	4 424	3 661	655	73
71	Commercial geography	1 800	1 585	1 354	135	75
72	Commercial law	876	785	255	25	29
73	History of commerce	174	156	75	1	43
74	Stenography, 50 word test	804	640	354	138	44
75	Stenography, 100 word test	222	214	140	70	63
76	Bookkeeping	8 421	5 858	4 568	585	54
77	Advanced bookkeeping	344	248	68	3	20
78	Business practice, etc	401	354	169	17	42
79	Business writing	1 827	1 652	1 191	107	65
80	Typewriting	231	206	117	15	51
81	Drawing	19 876	15 331	14 785	2 972	74
82	Advanced drawing	6 347	4 915	4 590	653	72
83	Psychology	451	403	290	32	64
84	Ethics	185	178	49	......	26
		538 833	411 039	353 939	75 750	66

N Preliminary and academic studies table (continued)

	SUBJECTS	Total no. of schools reporting	SUMMARY OF CRITICISMS FOR 1901									
			SATISFACTORY		TOO LONG		TOO SHORT		TOO HARD		TOO EASY	
			Total	Per cent	Total	Per cent	Total	Per cent	Total	Per cent	Total	Per cent
1	Reading											
2	Writing											
3	Spelling	1488	1364	.916	1		1		103	.069	19	.013
4	English, elementary	1495	1443	.964	2	.001			49	.032	3	.002
5	Arithmetic	1530	1432	.935	9	.0058			84	.054	6	.0039
6	Geography	1503	1315	.874	3	.0019			185	.123		
7	English, 1st year	324	301	.929	6	.018			17	.052		
8	English, advanced	1218	1183	.971	8	.006	1		25	.02	1	
9	English composition	1129	1119	.991	6	.005			3	.002	1	
10	English, 2d year	220	206	.936	5	.022			9	.04		
11	Rhetoric	910	885	.972	12	.013			13	.014		
12	American selections	443	428	.968	5	.011						
13	English, 3d year	101	96	.95	3	.029			3	.029	1	
14	English comp. advanced	310	306	.987	1				3	.009		
15	English selections	238	232	.974	3	.012			3	.012		
16	English reading	328	309	.942	11	.033			8	.024		
17	History of literature	246	241	.979	3	.012			2	.008		
18	Business English	141	123	.872	14	.099			7	.049		
19	German, 1st year	758	698	.920	1				59	.077	1	
20	German, 2d year	454	421	.927	2	.004			32	.07		
21	German, 3d year	213	184	.865	3	.014			29	.134		
22	French, 1st year	302	296	.98					4	.013	2	.006
23	French, 2d year	246	239	.971					6	.024	1	
24	French, 3d year	114	113	.991	1				1			
25	Spanish, 1st year	40	40	100								
26	Spanish, 2d year	31	31	100								
27	Spanish, 3d year	29	29	100								
28	Latin, 1st year	983	942	.958	2	.002			37	.037	2	.002
29	Latin, 2d year	129	128	.992					1			
30	Caesar's Commentaries	902	894	.991	1				7	.007		
31	Latin, 3d year	68	68	100								
32	Sallust's Catiline	117	116	.991					1			
33	Cicero's Orations	371	367	.989					3	.008	1	
34	Virgil's Aeneid	325	324	.996					1			
35	Virgil's Eclogues	49	49	100								
36	Latin composition	244	240	.983			1		3	.012		
37	Greek, 1st year	173	173	100								
38	Greek, 2d year	41	41	100								
39	Xenophon's Anabasis	197	196	.994					1			
40	Homer's Iliad	117	117	100								

N Preliminary and academic studies table (concluded)

	SUBJECTS	Total no. of schools reporting	SUMMARY OF CRITICISMS FOR 1901									
			SATISFACTORY		TOO LONG		TOO SHORT		TOO HARD		TOO EASY	
			Total	Per cent	Total	Per cent	Total	Per cent	Total	Per cent	Total	Per cent
41	Greek, 3d year	38	38	100	...	...	...	...	...	...	...	...
42	Greek composition	97	95	.979	...	...	...	...	1	...	1	...
43	Arithmetic, advanced	453	407	.9	11	.024	...	...	33	.073	2	.004
44	Algebra	1 274	1 147	.9	54	.042	...	...	83	.065	2	.001
45	Algebra, advanced	168	153	.812	8	.042	...	...	31	.164	...	...
46	Plane geometry	1 123	1 004	.894	58	.051	...	...	70	.062	1	...
47	Solid geometry	259	251	.969	6	.023	...	...	2	.007	...	...
48	Trigonometry	123	110	.894	11	.089	...	...	2	.016	...	...
49	Business arithmetic	308	247	.801	50	.162	...	...	14	.045	2	.006
50	Astronomy	214	209	.976	1	...	...	...	4	.018	...	...
51	Physics	682	661	.969	...	...	1	...	19	.027	1	...
52	Chemistry	247	241	.975	1	...	1	...	2	.008	3	.012
53	Physical geography	1 032	974	.943	1	...	...	...	54	.052	3	.003
54	Geology	252	240	.952	...	...	...	...	12	.047	...	...
55	Botany	333	284	.879	1	...	...	...	39	.120	...	...
56	Zoology	138	135	.976	...	...	...	...	3	.023	...	...
57	Physiology and hygiene	1 235	1 167	.945	...	...	...	...	66	.052	2	.001
58	Elem. U. S. hist. and civics	1 321	1 167	.883	11	.008	...	...	147	.111	2	.001
59	Greek history	444	431	.97	4	.009	...	...	10	.022	...	...
60	Roman history	463	450	.971	2	.004	1	...	10	.021	...	...
61	Medieval history	149	145	.973	1	...	...	...	3	.02	...	...
62	English history	576	536	.93	7	.012	...	...	34	.059	...	...
63	U S history, advanced	406	366	.901	13	.032	...	...	32	.078	...	...
64	Civics	1 114	1 057	.948	2	.002	...	...	54	.048	1	...
65	Economics	537	527	.981	1	...	...	...	7	.013	3	.005
66	Commercial geography	203	200	.985	2	.009	...	...	2	.009	...	...
67	Commercial law	99	98	.989	1	...	...	...	5	.05	...	...
68	History of commerce	61	56	.918	1	...	...	...	4	.065	...	...
69	Stenography, 50 word test	79	76	.962	2	.025	...	...	1	...	...	...
70	Stenography, 100 word test	46	46	100	...	...	...	...	...	...	...	...
71	Bookkeeping	813	634	.779	106	.130	2	.002	81	.099	...	...
72	Bookkeeping, advanced	83	68	.819	12	.144	...	...	4	.048	...	...
73	Business practice, etc.	74	73	.986	1	...	...	...	...	...	...	...
74	Business writing	170	156	.917	13	.076	...	...	1	...	...	...
75	Typewriting	65	64	.981	1	...	...	...	...	...	...	...
76	Drawing	1 134	1 102	.971	5	.004	...	...	23	.020	5	.004
77	Advanced drawing	320	307	.975	3	.009	...	...	5	.015	...	...
78	Psychology	3	3	100	...	...	...	...	...	...	...	...
79	Word analysis	1	1	100	...	...	...	...	...	...	...	...
80	Manual training	1	1	100	...	...	...	...	...	...	...	...

O

The following is a list of the apparatus required to perform the experiments suggested by the subcommittee on physics of the New York state science teachers association and incorporated in the *Academic syllabus.*

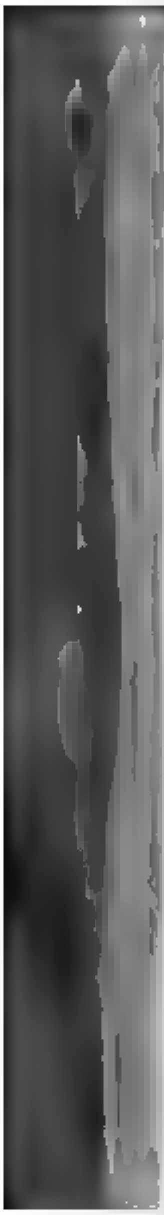
For references to textbooks regarding the experiments see the proceedings of the New York state science teachers association for 1899, High school bulletin 7.

1 30 centimeter stick
Meter stick
2–4 Apparatus for experiment 1
Specific gravity scales
Metric weights, 50 grams to 1 centigram
Can with overflow and catch bucket
Spring calipers outside
" inside
Micrometer
Three corner file
Spring balance
5, 6 ⅄ tube
Specific gravity bottle
Nicholson's hydrometer
Demonstration " wood
Hydrometer for liquids heavier than water
" lighter "
Specific gravity scales
Metric weights
7 Barometer tube
Mercury
8 oz casserole
8 Barometer tube
3 lb mercury
Mercurial barometer
(Aneroid barometer desirable)
9 Glass siphon
" model suction pump
" " force "

Air pump, lever
" Sprengel
10 Bottomless 2 oz bottle
Rubber diaphram
Perforated stopper
Glass end rubber tubing
Seven-in-one apparatus or Pascal's vase
Glass model hydraulic press
" ram
11 Spring balance
Rectangular block of wood
Weights (same system as spring balance)
12 Apparatus to show breaking strength of wire
13 Weights, supports, straight edge, scale, and test rods varying in 1) length, 2) width, 3) thickness, 4) material
14 Apparatus for experiment 12, with scale and with pulley and weights in place of spring balance
15 Support, circular scale, pair of spring balances and means of attachment, and test rods varying in 1) length, 2) diameter, 3) material
16 Mariotte's or Boyle's law apparatus
17, 18 Three spring balances and block to hold them fast to table
19 Center of gravity blocks
Cube
20 Incline plane with car or Atwood's machine
21 Small weights and cords
22 Incline plane with car
Set of pulleys
23 Apparatus for experiment 19
24 Cross section paper
25 Thermometer
Boiling water
Freezing water
26 Apparatus to show linear expansion
27 Glass flask with glass tube through stopper
28 Thermometer tube
Centigrade thermometer

Cross section paper
Ice
29 Apparatus for experiment 16
30 Conductometer
31 Convection apparatus
Circulation "
32 Glass retort
Still
Brass vessel
33 Chemical thermometer
Brass vessel
Various solids in finely divided state
34 Chemical thermometer
Glass vessel
35 Chemical thermometer
Brass vessel
Wet and dry bulb thermometer
36 Maximum and minimum thermometer
37 Apparatus for experiment 34
38 Flasks, chemical thermometer and jacket
39 Tube with water
Rod
40 Sonometer
41 Apparatus to record vibrations of tuning fork
Adjustable tuning fork
42 Lissajous's apparatus
43 Plate and holder for Chladni's figures
Violin bow
45 Photometer
46 Plain mirror
Concave and convex mirror
Apparatus to show incidence and reflection
47 Piece plate glass
Prism
Index of refraction apparatus
48 Simple grating
49, 50 Set demonstration lenses
Meter stick
Blocks for holding lenses

51 Bar magnet
Horseshoe magnet
Electro "
Soft iron bar
Battery
52 Bar magnet
Iron filings
53 Electroscope
Vulcanite rod
Glass rod
Pith balls
54 Leclanché cell
Bunse "
Grenet "
55 Pocket compass
No. 18 insulated copper wire
Battery
56 Galvanometer
Insulated copper wire, nos. 36, 30, 24, 20, 18
" German silver wire, nos. 36, 30, 24
Iron wire, nos. 24, 20, 18
57 Glass vessel
2 strips copper
2 strips platinum
Voltameter
58 Galvanometer
59, 60 Galvanometer
4 Leclanché cells
61 Galvanometer
Wheatstone's bridge
Rheostat
62 Apparatus for experiment 61 and heat
63 Induction coil
64 Apparatus for experiment 59
65 Cross section paper and apparatus for experiment 59



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High School Department

PUBLICATIONS

Examination reports 1894-97. O. *75c a vol*

Till 1894 these reports formed part of the general University reports, known as the regents reports. They cover courses of study in secondary schools, examination of professional students, licensing examinations for physicians, dentists, veterinary surgeons and certified public accountants.
Continued in 1898 as reports of college and high school departments.
See also B23.

Examination bulletins 1895-98. O. *To advance subscribers 50c a year.*

B4 (Examinations 1) Regents examinations. 82p. Nov. 1890. *10c.*
Historical sketch, laws, ordinances and rules pertaining to all examinations conducted by the regents; details as to all University credentials; subjects, times and places of examinations 1891-92; notes on the reorganization of 1890.

B5 (Examinations 2) Academic syllabus. 174p. Ap. 1891. *Replaced by* X8.

B10 (Examinations 3) Medical syllabus. 30p. Oct. 1892. *Replaced by* X7.

B13 (Examinations 4) Law syllabus. 120p. Mar. 1893. *Out of print.*
Outline of ground covered by examinations for the regents degree of bachelor of laws.

B23 (Examinations 5) Report of examination department 1893. 82p. Feb. 1894. *10c.*

X6 Report of examination department 1894. 126p. Mar. 1895. *15c.*

X7 Medical syllabus. 128p. Mar. 1895. *25c.*
Outline of ground covered by state licensing examinations, prepared under direction of the state boards of medical examiners for guidance of candidates.

X8 Academic syllabus. 204p. June 1895. *Replaced by* X24.
Syllabus of form study and drawing. 30p. 32pl. *25c.*
Reprint of p. 149-204 and plates from X8.

X9 Report of examination department 1895. 108p. Feb. 1896. *15c.*

X10 Examination papers 1896. 502p. Oct. 1896. *50c; small paper edition uniform with previous volumes 25c, boards 50c.*
See also Question papers.

X11 Davis, W. M. (Harvard) State map of New York as an aid to the study of geography. 28p. Nov. 1896. *5c.*
Based on the topographic map in preparation by the U. S. geological survey.

X12 Report of examination department 1896. 114p. Jan. 1897. *15c.*

X13 College entrance English. 148p. June 1897. *15c.*
Present English entrance requirements of representative colleges and universities. Also discussions on aims and methods in teaching secondary school English.

X14 Examination papers 1897. 578p. Aug. 1897. *Price, see* X10.

X15 Report of examination department 1897. 120p. Nov. 1897. *15c.*

X16 Examination papers 1898. 512p. Sep. 1898. *Price, see* X10.
The second edition contains only the academic papers, the professional papers being printed separately as college bulletin 3.

High school department reports 1898-date. O. [illegible]

High school department bulletins 1898–date. *In advance to subscribers 50c a year.*

X17 (High school 1) Director's report 1898. Mar. 1899 [illegible] *15c.*

X18 (High school 2) State science teachers association. Proceedings of the third annual meeting, Dec. 1898. 101p. Nov. 18[illegible] *Out of print*

X19 (High school 3) Associated academic principals. Proceedings of the 14th annual conference, Dec. 1898. 236p. Dec. 18[illegible] *25c.*

X20 (High school 4) Academic examination papers 1899. 30[illegible] Oct. 1899. *25c. Small size 12.5 x 20 cm, 25c; boards, 50c.*

X21 (High school 5) Director's report 1899. 70p. Feb. 19[illegible] *10c.*

X22 (High school 6) Associated academic principals. Proceedings of the 15th annual conference Dec. 1899. 188p. Mar. 19[illegible] *20c.*

X23 (High school 7) State science teachers association. Proceedings of the fourth annual meeting, Dec. 1899. 302p. May 19[illegible] *25c.*

X24 (High school 8) Academic syllabus. 226p. Ap. 19[illegible] *25c, cloth 40c.*

The University [illegible] to recommend any special textbooks, but for the guidance of teachers and students it specifies the ground covered by the [illegible] [illegible] subjects. This syllabus is the best available outline of [illegible] about [illegible] in these subjects.

X25 (High school 9) Manual training syllabus. 60p. May 19[illegible] *10c.*

X26 (High school 10) Academic examination papers 1900. 30[illegible] Aug. 1900. *Price, see X20.*

X27 (High school 11) Director's report 1900. 38p. Feb. 1901 [illegible]

X28 (High school 12) Associated academic principals. Proceedings of the 16th annual conference, Dec. 1900. 164p. Ap. 19[illegible] *25c.*

X29 (High school 13) State science teachers association. Proceedings of the fifth annual conference, Dec. 1900. 250p. May 19[illegible] *25c.*

X30 (High school 14) Academic examination papers 1901. 3[illegible] Aug. 1901. *25c; boards 50c.*

X31 (High school 15) Director's report 1901. [illegible]p. Jan. 1[illegible] *10c.*

Question papers. For the academic year 1892 (v. 1); 189[illegible] [illegible] 1894 (v. 3), 1895 (v. 4) [illegible] *boards 50c*

For 189[illegible] see X11, X14, X16; 1899 see X20; 1900 see X26; 1901 see X30. [illegible] [illegible] all the [illegible] papers of the [illegible] of the academic [illegible] [illegible] [illegible] After the [illegible] of the 1899 [illegible] papers the academic and professional papers were separated.

University of the State of New York

High School Departme[nt]

INCLUDING ACADEMIES AND ALL INTERESTS OF SECONDARY EDUCA[TION]

Bulletin 16 March 1902

ASSOCIATED ACADEMIC PRINCIPA[LS]

PROCEEDINGS OF THE

17TH ANNUAL CONFERENCE

Held at Syracuse city hall, 26-28 December 1901

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ALBANY

UNIVERSITY OF THE STATE OF NEW YORK

1902

Price 25[c]

University of the State of New York

REGENTS

With years of election

1874	Anson Judd Upson L.H.D. D.D. LL.D.	*Chancellor*, Glens Falls
1892	William Croswell Doane D.D. LL.D.	*Vice-Chancellor*, Albany
1873	Martin I. Townsend M.A. LL.D.	Troy
1877	Chauncey M. Depew LL.D.	New York
1877	Charles E. Fitch LL.B. M.A. L.H.D.	Rochester
1878	Whitelaw Reid M.A. LL.D.	New York
1881	William H. Watson M.A. LL.D. M.D.	Utica
1881	Henry E. Turner LL.D.	Lowville
1883	St Clair McKelway M.A. L.H.D. LL.D. D.C.L.	Brooklyn
1885	Daniel Beach Ph.D. LL.D.	Watkins
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1890	Pliny T. Sexton LL.D.	Palmyra
1890	T. Guilford Smith M.A. C.E. LL.D.	Buffalo
1893	Lewis A. Stimson B.A. LL.D. M.D.	New York
1895	Albert Vander Veer Ph.D. M.D.	Albany
1895	Charles R. Skinner M.A. LL.D.	Superintendent of Public Instruction, ex officio
1897	Chester S. Lord M.A. LL.D.	Brooklyn
1897	Timothy L. Woodruff M.A.	Lieutenant-Governor, ex officio
1899	John T. McDonough LL.B. LL.D.	Secretary of State, ex officio
1900	Thomas A. Hendrick M.A. LL.D.	Rochester
1901	Benjamin B. Odell jr LL.D.	Governor, ex officio
1901	Robert C. Pruyn M.A.	Albany
1902	William Nottingham M.A. Ph.D.	Syracuse

SECRETARY

Elected by regents

1900 James Russell Parsons jr M.A.

DIRECTORS OF DEPARTMENTS

1888 Melvil Dewey M.A. *State library and Home education*

1890 James Russell Parsons jr M.A. *Administrative, College and High school dep'ts*

1890 Frederick J. H. Merrill Ph.D. *State museum*

University of the State of New York

High School Department

INCLUDING ACADEMIES AND ALL INTERESTS OF SECONDARY EDUCATION

Bulletin 16 March 1902

ASSOCIATED ACADEMIC PRINCIPALS

PROCEEDINGS OF THE

17th ANNUAL CONFERENCE

Held at Syracuse city hall, 26-28 December 1901

OFFICERS FOR 1901

President, CHARLES H. WARFIELD, Little Falls
Vice-president, JAMES WINNE, Poughkeepsie
Secretary, S. DWIGHT ARMS, Albany
Treasurer, JAY CRISSEY, Jamestown
Executive committee: HARRY J. WALTER, Waverly; CHARLES E. KECK, Patchogue; CHARLES A. HAMILTON, Newark

OFFICERS FOR 1902

President, JAMES WINNE, Poughkeepsie
Vice-president, FRANK S. FOSDICK, Buffalo
Secretary, S. DWIGHT ARMS, Albany
Treasurer, ERNEST E. SMITH, Cambridge
Executive committee: GARY M. JONES, Watertown; A. C. ANDERSON, Forestville; ROBERT K. TOAZ, Oxford

Pres. ANDREW S. DRAPER, University of Illinois

2d session, Friday, 27 December, 9.15 a. m.

To what extent is it possible and profitable to mee
gents requirements for individual laboratory
physics?

IRVING L. BISHOP, Buffalo normal school

Prin. ROBERT K. TOAZ, Oxford academy and union s

Prin. JULIUS S. KINGSLEY, Newark Valley high scho

WILLIAM M. BENNETT, Rochester high school

Inspector CHARLES N. COBB, University of the State
York

GEORGE M. TURNER, Masten Park high school, Buff

The educational exhibit at the St Louis exposition o

Director HOWARD J. ROGERS, Department of ed
St Louis exposition

Some duties and responsibilities of a high school pri

Pres. RUSH RHEES, University of Rochester

Prin. WALTER S. KNOWLSON, Saratoga Springs high

Prin. AUGUSTUS S. DOWNING, New York training sc
teachers

School surroundings: hygienic, esthetic

Inspector EUGENE W. LYTTLE, University of the

3d session, Friday, 2.15 p. m.

Is the finished product of the high school efficient, upright and courteous; if not, why not?

Prin. MATTHEW I. HUNT, Islip high school

Inspector JOHN C. BLISS, Department of public instruction

Pres. B. W. HUTCHINSON, Genesee Wesleyan seminary, Lima

What of chemistry shall be taught in the high school and how shall it be most effectively taught?

Prof. L. M. DENNIS, Cornell university

Vice-prin. E. R. WHITNEY, Binghamton high school

HENRY H. DENHAM, Central high school, Buffalo

High school athletics: value, control

Prin. MILTON J. FLETCHER, Jamestown high school

Prin. SCHUYLER F. HERRON, Canajoharie high school

Sup't A. W. SKINNER, Oneida public schools

Prin. J. EDWARD BANTA, Binghamton high school

Prin. ALBERT H. WILCOX, Rochester high school

Prin. FRANK S. FOSDICK, Masten Park high school, Buffalo

Prin. CHARLES D. LARKINS, Manual training high school, Brooklyn

Prin. FRANCIS J. CHENEY, Cortland normal school

4th session, Friday, 8 p. m.

UNION MEETING FOR HIGH SCHOOL AND GRAMMAR SCHOOL PRINCIPALS

How can there be brought about a more effective articulation of the work and influence of the high school and the grammar school?

Prin. GEORGE W. KENNEDY, Troy grammar school 5

F. R. PARKER, Cortland normal school

Prin. BRUCE M. WATSON, Seymour grammar school, Syracuse

Sup't CHARLES B. GILBERT, Rochester high school

5th session, Saturday, 28 December, 9.15 a. m.

Presentation of new president of association by ex-Pres. Charles H. Warfield

Response

Pres. James Winne

Adjourned 10 a. m.

SUMMARY OF ACTION

Appointments

Friday morning the following committees were appointed by Pres. Warfield:

Committee on resolutions. A. S. Downing, New York training school for teachers; W. W. Miller, Friendship; F. J. Sagendorph, Hudson; J. M. Thompson, Penn Yan; J. L. Walthart, Massena. [For report *see* p. 332]

Committee on nominations. J. C. Norris, Canandaigua; W. S. Knowlson, Saratoga Springs; A. J. Merrell, Herkimer. [For report *see* p. 331]

Amendment to constitution

Prin. Walter moved to amend § 4 of the constitution, stating that the proposed amendment provided for two things that had been overlooked the year before: 1) it makes the vice-president, whom we expect will be the president the succeeding year, a member of the executive committee as he should be; 2) it makes the president, whom we hold responsible, the chairman of the executive committee.

The amendment was adopted as follows:

§ 4 The officers of the association shall consist of a president, vice-president, secretary, treasurer, and an executive committee of three, all of whom shall be elected annually by ballot and shall discharge the duties usual for such officers. The president, vice-president, secretary and treasurer shall be ex-officio members of the executive committee, and the president shall be its chairman. All ex-presidents are also members of this committee.

Pan-American exposition

Prin. Walter made the following oral report:

At the close of the meeting last year a resolution was passed directing that an exhibit of secondary schools be made at the Pan-American exposition and that the matter be put in charge of the executive committee. After some correspondence it was found impracticable to make such an exhibit and therefore the executive committee would report that it was impossible to make a satisfactory exhibit at that time.

Accepted

Bank for funds

Sec. Arms presented the following resolution and it was

Voted, That the president, vice-president and treasurer be designated as a committee to determine from year to year the bank or banks in which the funds of the association shall be deposited.

Increase of usefulness of association

Prin. D. C. Farr—It is well known that for 17 years we have continued a strong and useful body, but it is coming to pass that conditions are somewhat changed and it has occurred to many that possibly some changes in connection with our organization might be made. I therefore move that the president appoint a committee of five, to report one year from this meeting, to consider ways and means whereby the manner and method of conducting our meetings may be improved. This is not intended in any way to be a criticism on what is past but is simply owing to the fact that we appreciate how difficult it is for the officers themselves to make any changes, and to relieve them from embarrassment I make this motion.

Voted, That a committee of five be appointed to consider ways and means for increasing the usefulness and power of this association, to report one year hence.

The following committee was appointed: F. S. Fosdick, Buffalo; D. C. Farr, Glens Falls; James Winne, Poughkeepsie; C. F. Wheelock, Albany; W. S. Steele, Springville.

Reports

TREASURER

ASSOCIATED ACADEMIC PRINCIPALS

in account with JAY CRISSEY, *treasurer*

Receipts

1901				
May	7	S. Dwight Arms, treasurer...	$737 80	
Dec.	26–28	Dues of 1901................	433 ..	
	28	Grammar principals association	6 ..	
		Science teachers association..	4 ..	
				$1 180 8

Payments

1901			
May	10	F. D. Boynton, account syllabus committee.............	$18 25
	17	C. P. Brate, printing stationery	22 10
Oct.	28	William Fleming, account Trunk line association.......	17 ..
Dec.	24	Badges and registration cards	19 25
	26	A. S. Draper, expenses.......	53 ..
	27	Executive committee, expenses	35 23
	28	Helen Wynkoop, stenographer	7 69
		James H. Bary, janitor of city hall	7 50
Jan.	3	S. D. Arms, salary as secretary	50 ..
		S. D. Arms, postage and sundry disbursements	27 35
	6	E. E. Smith, account history exhibit 1900	4 50
	9	E. E. Smith, treasurer.......	600 ..
	22	M. L. Vanderzee, transcribing minutes of proceedings....	30 ..

Jan.	22. Jay Crissey, salary as treasurer	$25 ..	
	23 Fred W. Clemons, printing	30 ..	
	E. S. Averill, printing	2 50	
	25 F. D. Boynton, account syllabus committee	12 90	
	29 Jay Crissey, postage and sundry disbursements	2 49	
			$964 76
	Balance on hand		$216 04
	Held by E. E. Smith		600 ..
	Total funds		$816 04

Accepted

EXECUTIVE COMMITTEE

The following budget was recommended for the coming year:

For executive committee	$50
legislative committee	100
syllabus committee	50
printing and sundry expenses	100
secretary's salary	50
treasurer's salary	25
Trunk line association	10
stenographer	50
	$435

Adopted

COMMITTEE ON NOMINATIONS

The following were recommended:

Officers. *President*, James Winne, Poughkeepsie; *Vice-president*, F. S. Fosdick, Buffalo; *Secretary*, S. Dwight Arms, Albany; *Treasurer*, Ernest E. Smith, Cambridge.

Executive committee. Gary M. Jones, Watertown; A. C. Anderson, Forestville; R. K. Toaz, Oxford.

These officers were elected for the ensuing year.

COMMITTEE ON RESOLUTIONS

Prin. Downing submitted the following resolutions, which were adopted.

Resolved, That the sincere thanks of this association be extended to the city authorities, the city superintendent of schools and the press of Syracuse for their successful efforts in providing for the welfare and comfort of the members of this association and for the many courtesies extended to us during this meeting.

Resolved, That we, the academic principals, hereby express our appreciation of the generous hospitality shown us by the members of the University club of Syracuse in placing their club rooms at our disposal and thus rendering our visit to the city more pleasant.

Resolved, That the secondary school is a necessary part of public education; that our social and political conditions demand its existence and justify state and local authorities in contributing ample funds for its support; that every child residing in the state of New York should have the privilege of attending a secondary school at public expense, and to this end provision should be made by the state for children residing in districts not maintaining secondary schools.

Resolved, That the legislative committee of this body be empowered and directed to take such action as is deemed most advisable during the next session of the legislature to give to the department of public instruction power to approve all plans for the sanitation and ventilation of school buildings hereafter to be built, and to require a minimum standard of effectiveness therefor that shall not be less than that set by the district police of the state of Massachusetts.

Whereas, At the world's fair to be held in St Louis in 1903 there will for the first time be given worthy recognition of the true place which the educational institutions of any country occupy in influencing the progress and development of that country, and

Whereas, We believe that among the states of the Union our own Empire state has reason not only to be proud of her elementary schools, her secondary schools, her institutions of higher education and of her organized departments of education, but that the wealth, happiness and prosperity of her people are in a large degree the outgrowth of these educational forces, therefore,

Resolved, That we place on our legislative committee the responsibility of urging to successful issue the appropriation

of a sum of money adequately large to enable this state to r a full, complete and proud showing of her educational forc St Louis in 1903.

Whereas, We appreciate the extreme need of proper hyg conditions to enable pupils to get an education without b injury to themselves; and,

Whereas, The laws of this state provide only that no sc building shall be erected in any school district or union school district till the plans for ventilating, lighting and ing the same shall have been approved in writing by the sc commissioners, no instructions, however, being given school commissioners as to minimum requirements for v lating, lighting and heating school buildings; and,

Whereas, The school commissioners have no charge school matters in cities, so that all city school buildings erected without even this check on their plans. There be it,

Resolved, That the legislative committee of this associa be and hereby is instructed and directed to draft a bill, an use all proper means to secure the passage of the same thr the state legislature, which shall provide and fix minimum quirements for buildings erected for use as school build and for rooms fitted up for occupation as schoolrooms, in following items, to wit:

1 Per cent of window surface in the walls of each sc room.

2 Greatest distance at which any child shall be seated a window.

3 Relation of seats to windows as to proper light for pu desks.

4 Amount of floor space for each pupil.

5 Number of cubic feet of air space for each pupil.

6 Number of cubic feet of fresh air a minute to be furni each pupil.

7 Per cent of desks in each room which shall be capab adjustment to fit individual pupils.

Greetings. Pres. Warfield appointed Prin. G. M. Dav Prin. H. C. Conant and Prin. W. T. Palmer a committee to c the greetings of the conference to the grammar school cipals then in session. This committee reported later that had presented to the grammar school principals the follo invitation:

The Academic principals conference in convention assembled hereby tenders to the Grammar school council cordial greetings and an invitation to participate in its deliberations. Congratulations are offered on the past success of the council and best wishes for the future are extended. The conference also desires to acknowledge the kindly greetings of the council.

On Friday the following message from the Grammar school council was received:

We, the members of the New York state grammar school principals council, assembled in convention, send greeting and extend a cordial invitation to the members of the Academic principals association to visit us at any of our meetings in the common council chamber, city hall, Syracuse N. Y.

S. P. MOULTHROP
LEONA L. WALKER
LUCINDA E. FEENEY
C. P. ALVORD
Committee

ADDRESSES, PAPERS AND DISCUSSIONS

Thursday evening, 26 December

Pres. C. H. Warfield—I take great pleasure in being able to present to you as the speaker of the evening one who needs no introduction to an audience of New York schoolmen—Andrew S. Draper, president of the University of Illinois. He will address us on "The element of inspiration in the work of the schools."

THE ELEMENT OF INSPIRATION IN THE SCHOOLS

BY PRES. ANDREW S. DRAPER, UNIVERSITY OF ILLINOIS

The growth of the American school system supplies material for a remarkable, a fascinating, even a patriotic and glorious story. No other great people ever gained such splendid educational conceptions; the masses stand for unlimited educational opportunity to every son and daughter of the people. No other people ever thought of providing schools for every rod of such a wide and sparsely settled territory as ours; no other people ever attempted to provide the best free schools of all

grades for all classes in such cities as ours. No other great nation in the world has builded an educational system on such plans—so flexible, so adaptable to the national ends, so expressive and promotive of the national life. And it has not been done by a monarchy, or by a ministry through the use of dictatorial powers, but by the millions of a great, liberal people, moved by the highest purposes, acting through primary meetings and then exercising sovereign powers through representative and responsible assemblages. What other people in all history ever overcame the inertia of conditions, ever triumphed over the hindrances to cooperative action in the multitude, ever supplanted the rule of force with the rule of love and of sense, ever brought scientific investigation and rational and systematic methods to the training of the child so completely and successfully, ever made such munificent public and private gifts to learning, ever took all the great steps leading to such splendid realizations of noble purposes, quickly, unitedly and effectually, as that mighty people which has been compounded out of all the peoples of the earth in this free land in the last two generations of men? Some other peoples have done much; some other peoples are doing some things in their schools better than we are doing those things in ours; but it is not too much to say, and as it is true it is a glorious thing to say, that the thinking and the doing of no other people ever resulted in such a comprehensive, such a unique system of popular education as that brought forward by the American people in the last half century of time.

It is not speaking unadvisedly to attribute this splendid advance to the last two generations of men and the last half century of time. No one lacks in appreciation of that foresight and heroism of the fathers which laid the foundations of the Republic; but the conditions which have made the modern American school system necessary and possible had not developed in the days of the fathers, and their wisdom and their strenuosity were otherwise abundantly engaged. They were obliged, as we shall be, to leave some things to be done and

some glory to be gained by the men and women who possessed the land after them.

We are again and again enjoined to look forward and not back, but it will not be a grievous sin if we violate the inspiring injunction in order that we may understand the present more readily, realize the responsibilities which are on us, and look forward more clearly and confidently.

A thousand years ago great throngs of people moved out of northern and central Europe and compounded a new nation in Britain. Either because of the constituent elements, or because of some sort of chemical action resulting from the compounding, that nation soon showed some traits which were very unusual and very great. It showed something of an understanding of the God-given rights of the individual man, as well as something of the necessity of organized society; it showed both readiness of initiative and self-control; it showed intelligence which could set rational limits to the prerogative of the king, and even fortitude which would defy the power of the king, without destroying the kingship or overthrowing the kingdom; it developed the constructive genius to set up a more stable constitutional government in larger measure than any other people had ever done; it developed much spiritual life, blemished of course by the superstitions and irrational customs of an age when force ruled and darkness covered the earth; it advanced slowly but steadily in the arts and sciences; it created armies and constructed navies, entered into world relations, dreamed of world conquests more than it realized world responsibilities, did much wrong but more good, gained in outlook and in conscience and in power through the doing; and finally used its power for the enlargement of freedom and the development of law more rationally and forcefully and broadly than had ever been done by any other nation. And its standards of liberty and its gradually unfolding system of law have stood the test of time and of changed conditions because they rest on foundations which are immutable and accord with fundamental principles

which the infinite conscience of the world holds t(able and eternal.

But English freedom did not come to its full fl Security was assured before liberty was gained.] some would move faster than others, and differ bitter persecution and fratricidal war. Some br came to the new world and set up government in t They brought English traditions and laws and in them. They would leave behind some things no but they expected in essentials to follow the E In their persons and in their political organizati were glad to be, and expected to continue to be, king and parliament of England. In time other sent colonies to our shores. Some of them brou institutions of their own. Colonial relations we English thought and feeling and usage were some but in essentials the English exercised control policies happily prevailed.

A new nation resulted. It was not quite lik nation, but it never ceased to be an English nati work in the open air, led liberty to grow, but resp ment did not grow. Governmental limitations Rule from over the sea was distasteful. Our fa be opposed to parliaments as well as to kings. be jealous of all government that could govern. dices carried them almost to chaos, and but for conscientiousness and resourcefulness of their ra carried them to destruction. Separation was i inevitable. Unhappily it had to come by violenc

The fact that independence was gained by wa lowed by another war with England, estranged both the older nation and the younger one from which each most needed and which none but tl give. In America the heavy burden of conquerin fear of delegated authority and centralized pow

hue of the spiritual life, and the coveted isolation, impeded both the intellectual and industrial advance imperative to better living. The pace was even slower and more uncertain in the new nation than in the old. The average American up to the middle of the 19th century was not far from the intellectual or industrial plane of the average Englishman of the time of Elizabeth or of Cromwell.

Then history began to repeat itself. The very peoples from whom great throngs went a thousand years before to enter into the building of the English nation began sending yet greater throngs across wider seas to an endless and unexplored country to combine with the resultant stock and compound yet another nation. All the other peoples of the earth have sent their thousands and thousands also, and out of all these a new nation and a new civilization have emerged. It is governing and occupying the western world. In all this the English language has prevailed, the essentials of English character have dominated, and the fundamentals of English liberty are everywhere prized above all of its possessions as the sacred legacies of the inspired heroes of generations gone. But the new nation is not an English nation. It owes much more to old England than to any other, and perhaps more than to all others, but it has distinguishing traits, brought into its life by other peoples and growing out of its own experience, which are quite its own. It has reached the point where it exerts more influence on English life, and infinitely more on the life of every other nation, than England or any other nation does on its life. It is an American nation, known and regarded at every capital and among every people in the world.

It has brought forth new ideals and new measures of freedom, physical freedom, social freedom, political freedom, intellectual freedom, religious freedom and industrial freedom. It is still God's truth, and it is God's truth now in a larger sense than ever before, that American youth are free to break through the barriers and gain knowledge and power, and win success and fame

as the youth of other lands can not, under their systems, hope to do.

It has made a new manner of people through making more of the individual man; it has created altogether new measures of public power through unwonted combinations of multitudes of forceful men and women; it has centralized and made quickly available the power and authority of a great people in a manner which surprises the world; and better than all else, it has in the years of its great strength, as never before, shown its purpose to use its power to sustain right and justice and decency, to aid the weak and to replace the rule of force by that of reason in all the world relations into which it has been unwittingly drawn through the steps which its self-respect compelled it to take in order to rescue a frail and beautiful island at its door from intolerable outrage.

Happily, too, only the other day, it completed a treaty with the mother country removing causes which have irritated both peoples for half a century, and opening the way for better and more mutually helpful relations and for great world enterprises of the first moment to mankind. We do not approve all that Great Britain does, but who can have so little knowledge of the forces which help on the world advance as to be unable to see the importance of amicable relations between these two great English speaking, constitutional, liberty loving, nearly related nations?

Our national evolution has been more keenly realized by the thinkers of other nations than by those of our own. Their familiarity with the conditions in other lands is quickening, and their point of view is better. It is somewhat anomalous that the most philosophic and commendatory discussions of our constitutions and our institutions have been by four great scholars of foreign birth, Francis Lieber, Goldwin Smith, James Bryce and Hermann Eduard von Holst.

While these men analyze judicially and admire with enthusiasm, there is no lack of educated men of native birth who give

their productive energies to little beyond the apprehension of trouble. Our every advance makes them shudder; our very successes move them to anguish. They are having nothing but their distress for their perplexity. The men and women who make the bone and sinew of the nation are doing their work and eating their bread, and reading their papers and singing their songs and sending their little ones to the schools, and exercising their political powers, and moving up to higher and yet higher planes of living, with a pride in our institutions which is consuming, and with a confidence in their stability which is absolute.

Of course no intelligent man can ignore the fact that all political life, like all life, is subject to injuries and diseases. The suffrage is somewhat corrupted. The law is now and then sold out for abhorrent barter in high places. Rank and sometimes brutal partizanship obtrudes itself into official stations created to execute the common will and bound to treat every one with equal justice. Public business is frequently managed horribly by men who have neither the capacity nor the honesty to manage any business, not even their own, safely and well. But sane men are not overcome by this; and patriotic and heroic men go about curing it. The power of our democracy to sustain our unique public institutions has been demonstrated. Political diseases may be less in number, they surely are not less in amount, when a king and his court cause all of them because they have all of the opportunity. Health depends on exercise. Political health depends on the free exercise of political power. There is stronger financial integrity where there are banks than where there are none. There is more political integrity where there is political freedom than where there is none. We have no alternative but to trust the crowd. We need have no fear of results after discussion. There is ground for gratitude at the growth of the American public conscience. If our pure democracy has been dishonored it has been behind closed doors and in supposed security from public indignation. If there has been some apparent indifference to political evils it has been because we are over-

occupied, because the wrongs have been considered relatively unimportant, and because of entire confidence in the power of our democracy to visit abundant retribution on the miscreants before their work shall become a menace to our institutions.

Foreigners are amazed at the volume of our legislation. They can not understand it at all. It seems to them that nothing stays fixed, and that there is little to be depended upon. Some of our own doctrinaires are troubled also. But this is a new country. It is growing and advancing more rapidly now than ever before. Not many things beyond the fundamentals embedded in the constitution are expected to stay fixed just yet. Legislation can do little enduring harm. If it violates principles the courts overthrow it; that is not the case in any other land. If it is not supported by sentiment it is not executed, or is soon repealed; this is not the rule in any other land. This is the people's land. We have to resort to much legislation to go forward. It is the glory of our country that her people are given to reading and discussion; that sentiment changes and advances; that her laws are not immutable, but are to respond quickly to new conditions, express new sentiments and help on new purposes. Far more good than harm has come of our much legislation. We have overcome the sodden lethargy of barbarism, the depressing self-satisfaction of settled civilizations, by the spirit of our pure democracy flowing freely, ofttimes in poor form, sometimes with doubtful wisdom, out of the acts of our legislative assemblages.

Let me use a concrete illustration. Two or three years ago I fell in conversation with an accomplished English gentlewoman, chaperoning her nieces who were sight-seeing on the continent. With some ill concealed amusement she asked why American heiresses were so eager to marry English noblemen. It was answered that there were comparatively few such marriages; that in some cases they were legitimate alliances; but of course there were a few very rich people in the States who were ready to give all they had to give for a title of nobility. Remembering what I knew must be the English law I remarked that of course

it was all right for an English girl who knew no difference, but that I could not see how an American girl with knowledge of the legal status of the married woman in England could think of becoming an English wife anyway. The English woman was surprised and one remark led to another till she inquired whether an American gentleman would not be held to be within his rights, and saying a perfectly proper thing, if he were to declare in public that he would not allow his wife to go here or there or do this or that. The reply, with pride at least equal to her amusement concerning American heiresses and English lords, was that such an incident could not occur in America, and that one saying such a thing would be held to be a boor and not a gentleman: that an American husband and his wife are equals; that they settle their policies at home and not in public; that each is ordinarily only too glad to regard the wishes of the other; and that if one is not so minded the public will visit its disapproval on the offender though the law will take no cognizance of the matter till the offense is so grave as to overthrow the home, and then it will intervene and give the property and the custody of the children to the one who has done most to maintain the parity of the parents and the stability of the home.

It leads one to reflect on the extent to which the married woman in America has become the product and the maker of American institutions. Our democracy found her, under the English common law, without rights or remedies of any kind beyond the right to live and be exempt from cruel violence. If she had personal property it became the husband's absolutely on marriage; if she had real property it became his for life and he could alienate it in his lifetime or dispose of it by will. If he invested in improved real estate she acquired the bare right to the rents of one third of it so long as she remained his widow. It was within his legal power to give or will what his wife brought to him to his own relatives. She could not make a will at all. Her services and earnings were his. The children were under his exclusive control. He could educate

them or not at his pleasure. He had a motive for keeping them from school, for their labor as well as their mother's was his; and he had the legal right to inflict physical chastisement on her as well as on them.

We have changed all this, but we could never have done it all at any one time or in any one place. Our statute law has in a crude and piecemeal way, the natural product of our gradually advancing democratic life, given the wife a legal status nearly equal to the husband's, and in doing that has done much more. It has made the wife a companion and helper; it has made the mother a decisive influence in the home; it has changed the character of the home, and in changing the character of the home it has changed the character of the nation for the better. It seems to me that it well illustrates the spirit and the methods by which we advance our American institutions.

We might speak of the influence which our democracy has exerted on the religious life of the country. Toleration and discussion and the separation of church and state incident to the growth of individualism and to equality under the law; the putting away of superstitions; the refusal to permit the mere wording of creeds written in the middle ages to bind the thinking and the feeling of modern life; indifference to the mere forms of worship—all of which are inevitable sequences of the intellectual advance, have changed the conceptions of God, have forced the evolution of a theology capable of reconciliation with scientific truth, have lessened the skepticism which existed but which was hidden, have deepened faith in the universal fatherhood of God as they have established the universal brotherhood of man and made the unity of God and all his children vital in the world.

There have been few products of our democracy so notable as the advance in our industries and our commerce. We meet all the rest of the world and defeat them easily in fields which can be won by multiplying the productive power of our population through ingenious machinery. The United States commis-

sioner of labor points out that where 1000 paper bags once took 6½ hours to make by hand they are now made by the machine in 40 minutes, and that it formerly took 4800 hours to rule both sides of 10 reams of paper, while with modern tools one man does it in 2½ hours. Col. Wright adds: "An ordinary farm hand in the United States raises as much grain as three in England, four in France, five in Germany, or six in Austria, which shows what an enormous waste of labor occurs in Europe because the farmers are not possessed of the mechanical appliances used in the states." Who can contemplate these things and doubt American preeminence in trade or fail to see that whether we will or no we are facing very great international transformations?

American mowers and reapers, American shoes and clothing, American cash registers and typewriters and bicycles and automobiles and locomotives are invading all lands. I stepped into a shop on the Strand in London to get some shaving soap and remarked that I "supposed Pear's was the best." "It is very good," the clerk said, "but we generally sell Williams'." American flour grown in Dakota and milled at Minneapolis is making better bread than they have ever seen before in India. American engineers are building cantilever bridges in Burma and electric subways in London. American machinery is handling coal in Germany and an American trolley road passes the pyramids of Egypt. Mr Frank A. Vanderlip, formerly a student at the University of Illinois, and recently assistant secretary of the treasury, is responsible for the statement that in the last six years we have sold abroad in produce and manufactures $2,000,000,000 more than we have bought, while from the beginning of the government up to six years ago the foreign trade balance in our favor was but $383,000,000.

I have recently come on an elaborate editorial from the *London daily telegraph* entitled, "America, the universal competitor—a continent coming of age." If I could put aside my paper and read the whole of that to you it would be of more service than anything I can say. Let me quote a few sentences:

It is more than questionable whether the average Briton has even yet any sure conception of the overwhelming character of America's natural resources as compared with any European scale. Every factor in her industrial greatness is on the giant measure either of performance or potentiality. She has two long shores upon the two main oceans. Her navigable waterways are more wonderful than those of Siberia or Brazil, for they do not flow towards ice like the one or through the dense tropics like the other. There is nothing anywhere in the czar's dominions to compare with the St Lawrence and the Great lakes leading ocean traffic for 2000 miles into the heart of a continent. The American farmer has marketed at nearly 40c a bushel in recent seasons corn which it cost him 15c to produce. The United States raises nearly two thirds of the raw cotton in the world. She raises sugar from the cane in the south, from the beet in the west, from sorghum in the center, and from the maple in New England. From California to Florida the country is opulent with orchards. Her harvests are a sea of golden grain stretching over many times the entire area of the British isles. The immense mineral deposits of America are still won in great part near the surface, not by deep shafts, long drifts and expensive workings of older mining countries like our own. The coal area of the United States is far wider than that of all Europe put together. She is now first, both in gold and iron, and produces all the metals but tin. Her herds of horses, cattle, sheep and swine are such as the pastoral imagination of the more primitive world might have seen only in dreams. Her waters swarm with fish. And while there are already 76,000,000 of inhabitants in America there is still 16 times as much space to each soul as in these crowded islands; and 12 times as much as in Germany.

I can not ask you to listen longer to a quotation, but let me exploit one sentence of this foreign writer to make evident the fact that what we have won has not come inevitably, or easily, but has been gained through effort and genius. The sentence is the brief one, "America is now first in gold and iron."

We used to get all our steel from England. A little more than 100 years ago the state of Pennsylvania loaned $1500 for five years to enable a man to try to make bar iron into steel "as good as in England." 90 years ago our whole country produced 917 tons in a year, 70 years ago 1600 tons in a year, 50 years ago 6000 tons in a year. It was of inferior quality and cost from

6c to 7c a pound. Commencing in 1864 the Bessemer processes improved the grade and reduced the price to less than 1c a pound. Then the iron age passed away, and the steel age came. and the great battle with foreign makers was on in earnest. It has been a battle royal. In 1873 the United States produced 198,000, and Great Britain 653,000 tons of steel. In 1899 the Republic made 10,600,000, and Great Britain 5,000,000 tons. In that year we were making more than 40% of all the steel made in the world. In 1891 we exported 15,700 tons of steel rails; in 1900 it was 342,000 tons. In 1891 our iron and steel exports were valued at $29,000,000; in 1900 at $122,000,000. In the last 30 years the British steel rail exports have fallen off 80%. During the progress of this great contest the promise has at times seemed to be with the old world and then with the new. Now our triumph has become complete and we seem to have gained a secure hold on the first place in that mighty industrial art which is of more moment to national prosperity and stability than any other.

If it is true as has been said that "if a man have better iron than you have he will soon have all your gold," it is not strange that in the last two or three years large amounts of European capital have been withdrawn from the United States, and that England, Germany and Russia have become, for the first time, borrowers of American money. Who can fail to see the significance of all this or be blind to the fact that it means quite as much to the labor as to the capital of the United States?

But let us not be too much puffed up or too rapacious. The foreign trade of Great Britain is almost a matter of life and death with her. We could get on very well by ourselves. We could raise all we need; we could make all we must have; and we could prosper without selling in foreign markets. But it is not so with her. She can not meet the needs of her people out of her own fields. Her workers must depend on materials we send to them. If her manufactures do not command other markets than her own her mills must stop and multitudes of her people *must* come to want. To send manufactured goods as well as

raw products to her is clear gain to us. But our clear gain depends on her prosperity and her ability to buy. We wish her well for her own sake and for our own. It is so with the other nations. There is a democracy of thrift and fair dealing governed by natural and inviolable laws. Thrift and fair dealing help each other everywhere. Overreaching defeats itself. The industrious are the wheel-horses, and commercial integrity and fair dealing are the leaders of civilization.

We may well be on our guard against avarice and insatiable methods. We owe our industrial preeminence to those creatures of our laws, the corporations. Economic conditions and natural laws of trade are forcing them into great combinations. We can not change those conditions, and we are likely to be worsted in a contest against the laws of nature and the inevitable trend of trade. But there is no rule of moral action binding the individual man which does not rest on men in combinations. Corporations are subject to the same moral code as individual men, and they are amenable to the people who created them as individual men are not. Such of them as use the powers which the people have granted to them to crush individuals and break down the freedom and limit the volume of trade, such as refuse information concerning their affairs and resort to legal subtleties to extort dishonest gain, such as corrupt political action that they may seize prerogatives opposed to the common weal, are to be punished and regulated, or strangled. Such as can not be controlled will be strangled. The people are not going to block the highways of traffic, or break or overthrow the law of contract, but they are not going to be despoiled or defied through the unlawful exercise of privileges which they have conferred and which they can withdraw.

The highways of progress must all be strewn with the wreckage of contests. Along such roads, grappling with such responsibilities, democracy is advancing to its completest triumphs. It may be more agreeable to some people to be undisturbed, it may be easier to keep isolated, but if democracy were to maintain exclusiveness and avoid contests at a time when the older

forms of government are exerting every effort and resorting to every device to extend their political systems and conquer commercial supremacy, then it must know that it is not as worthy of dependence, that it is not as capable of serving the highest purposes of nations, as more consolidated forms of government have proved themselves to be.

We accept no such conclusion as that. We have recently said, with almost one voice, in a deliberate and authoritative way unknown to any other political system, that the Republic can of right do anything which any other sovereign nation can of right do. We have recently learned, without suspecting it, that our people stand ready to deal with any internal or external problems which world conditions may bring on us. We shall do it without danger to our system; indeed our political system can acquire the strength of manhood only through the doing of it. Our democracy has come to its majority. In the words of the English writer, a continent has come of age.

I have been looking into our political history, our intellectual and spiritual evolution, our industrial advance and commercial conquests a little, though the fascination of the subject has beguiled me into doing it more at length than I had intended, in order to get a fresh understanding of the people and the interests to be served by the American schools. American schools have from first to last reflected American economic and political conditions. It may well be doubted whether the schools determine the course of a people. They may be the implements which break out the roads; they may be the lamps which light the course, but they are the instruments more than the creators of civilizations. Civilizations and their institutions are the products of the Almighty Power working through the souls of men.

The schools have advanced with the growth of the nation and the progress of civilization, but we may very well question whether the schools of our fathers did not better represent their civilization than our schools represent ours. If this is so it does not reflect on us for it was far easier for them to make

schools which could meet the moderate demands of their day than it is for us to understand the tendencies and the claims of these seething times and erect schools which can meet present needs.

Let us not forget that there was real teaching before there was much educational philosophy, and before methods were reduced to forms and expressed in rules. This does not discredit the philosophies, and it is not a reflection on the training in methods which have saved us from chaos in the centers of population and in the large schools at least. It only means that the primitive schools had easier tasks than we have.

They could stir enthusiasm easier than we. Teaching depends on the interest of the pupil. The interest of the pupil depends on the adaptation of the subject and the spirit of the teacher. The trouble with the greater number of children in our larger schools is that they never gain enthusiasm over anything. They live just ordinary, dronish, dead level lives because not touched with the vital spark which would start their machinery into action. The teacher of the early schools worked directly with the individual pupil, understood him better, and was more easily able to do the things which would fire his soul, for the schools were small.

Beyond all question we are trying to do too many things. The quantity of work which a child does under duress is not so important as that he shall do something because he likes to do it. Before he can like to do it he must be able to master it completely. He must be able to have the satisfaction of a full triumph. Growth depends on the power to do. The power to do waits on doing. It is not the doing of this particular thing or that; it is not following prescribed formulas containing so many grains of this or that; it is finding pleasure in the doing of something so that one comes to do it easily and acquires the desire and the power to do something harder. That is growth. The early teacher could choose work suited to particular pupils, and was free to do it, for he was a law unto himself. And so teacher and pupil worked together on subjects which they could master and which they therefore enjoyed. They

accomplished things, and in the doing they gathered the strength and the ambition to do larger things. That was teaching.

Aside from the matter of close touch with the individual pupil, there is undoubtedly a loss to the spirit of the school because of the grading of pupils and the segregation of classes. Young pupils gain as much from hearing older ones recite or seeing them fail as from their own books and their own recitations. The mixing of pupils in the one room school did stir thought and generate ambition.

The old time school declamation on recurring red-letter days in the regular routine of the early schools was a great stimulant to boys and girls. It was not more in the words that were heard than in the fact that the boys themselves gave expression to them. It is the doing of things which stirs ambition and creates power, even the doing of things which some one else has done. There are plenty of men prominent in affairs who would gladly testify to the uplifting influences of the masterpieces of oratory and literature on their own lives by means of the school declamation.

If I could have my way there would never be another schoolhouse built without an assembly room large enough to accommodate at one time, and artistic enough to attract, every child who has a place under the roof. At least so much should be done to break the endless monotony of book study and the grade recitation; at least so much to stir the soul through the singing of the multitude and the magnetic touch of the words that are spoken in the crowd.

The intensive work of each class in a graded school is preparation for the class beyond rather than preparation for life. The studies multiply rapidly as the grades advance, and the tendency to require the grade below to prepare pupils for all they may have to do in the grade above is irresistible. The teacher is discredited if her pupils can not carry all the work and do all the particular things which have been placed in the schedule of the next grade. The upper school is really the only yard-

stick for an early and accurate measurement of the work of the school below. It is better than none, and for the crowd it has made the schools better than they used to be, but it tends to routine, and it acts against individuality and does not encourage those personal traits without which one never rises above the level of the crowd.

And the grading of the pupils results in the grading of the teachers also. The pupils move on from one grade to the next; too often the teachers are stationary and their work and their outlook completely circumscribed. It is not their fault; they are conscientious enough; they would broaden out and go forward if they could. If the administration of the schools is free from the curse of influence, if growth is certain to win a position of greater influence and better pay, and if steadiness and power are sure to be awarded with the commendation and respect of a community, they will broaden and strengthen and drive the work of the school with a spirit which gives life and inspiration to pupils. If the reverse of these conditions prevails they must be made of unusual stuff if they do not succumb to the withering routine of the unending grind and become mechanical automatons in the pint cup of a single grade.

The professionalization of the schools tends to separate them from the people. I am not saying that the advantages of this do not outweigh the disadvantages; I am only calling attention to the fact that there are disadvantages. The schools are not so responsive to popular sentiment. Parents do not understand very much that is going on in them and are impliedly told that it is beyond them and that they can not expect to understand. What their children are trying to do confounds them. They are willing to be confounded if they can only believe that their children will be better and brighter and stronger than they are, but they can not down their incredulity. Specialization has in some directions been carried to an extent which is absurd, and the confident and conflicting wisdom of educational experts on physical and mental and spiritual subtleties is confounding to people who take such things seriously, and amusing to men and women

of humor and sense. It weakens the relations between the people and the schools.

We are accentuating the importance of technic in the schools to an extent altogether unprecedented. For example, we are training for better form in the oral or written expression of thought or of fact. Certainly there is enough need of it. But it can not be denied that it is limiting the range of thought and the freedom of expression. Pupils are led to think less of what they shall do than of the form and style in which they shall tell of it. Form is not substance, and while substance may well respect it it is not to be made the slave of form.

I am inclined to believe that the literature in general use in the schools makes for culture at the expense of strength. I am in favor of culture but not at the cost of manliness, of independence, and of power. The literature which was used in the early schools was rather hard for the cutting of intellectual eyeteeth, but once masticated it gave strength. I have in my library a little leather covered book printed in small type on very brown paper, in size about 3 by 5 inches, with 250 pages. I would rather part with any other book or any other set of books I have, for the flyleaf tells me, in very legible penmanship, that it was my father's school reader in 1824 when he was 15 years old. Some of the titles, taken at random, are: "Change of external conditions often adverse to virtue," "The misery of pride," "The vanity of riches," "The mortifications of vice greater than those of virtue." "The pleasures resulting from a proper use of our faculties," "The philosophy which stops at second causes reproved." "The pleasure and benefit of an improved and well directed imagination," etc. These subjects would hardly appeal to a 15 year old boy now, but in the days when they were used they were discussed and digested, and entered into the making of strong if not brilliant character.

The tendency has been to regard form and beauty too much. and force and strength too little. Beauty is attractive but it is not exclusively important. It is all right for the schools to teach form, but it must always be remembered that life is more

important than form. If either is to be subordinate life m be uppermost. Beauty in form does not produce effectiver in life. Intensiveness in life makes beauty in form. Even great things in art have not been produced by copyists of fo but by men and women with gifts developed without much side aid. The truly great things in literature have not b born of the study of literary style, but of the conflicts of str minds and the strivings of great souls. And they have not b on things artificial, but on things real, grave, inexorable, mighty events swept along by the irresistible, underrunning rents of human life.

Hear David, waiting in anguish the issue of the battle assured of victory, asking the first messenger for the infor tion which meant most to him, "Is the young man Absa safe?" and then in breathless anxiety, of the second mes ger, "Is the young man Absalom safe?"

And Cushi answered, "The enemies of my lord the king, all that rise against thee to do thee hurt, be as that yo man is."

And the king was much moved, and went up to the cham over the gate, and wept; and as he went, thus he said: "O son Absalom, my son, my son Absalom! would God I had for thee, O Absalom, my son, my son!"

Hear the Greater than David: "Whosoever shall receive child in my name receiveth me; and whosoever receiveth receiveth Him that sent me; for he that is least among you the same shall be great."

Some of us yet feel the effect of the burning verse rising of the consuming times of the war between the states. E Dr Holmes:

> Flag of the heroes who left us their glory,
>   Borne through the battlefield's thunder and flame,
> Blazoned in song and illumined in story,
>   Wave o'er us all who inherit their fame.

Hear Mrs Howe in the *Battle hymn of the Republic:*

> He has sounded forth the trumpet that shall never call retreat
> He is sifting out the hearts of men before His judgment seat:
> Oh! be swift, my soul, to answer Him! be jubilant, my feet!
> Our God is marching on.

Hear a few familiar sentences from the great Lincoln. In the Springfield depot: "Here my children were born, and here one of them lies buried." In the Newton Bateman letter: "I know that there is a God and that he hates injustice and slavery. I see the storm coming and I know that His hand is in it." In the Greeley letter: "My paramount object is to save the Union, and not either to save or destroy slavery." "I shall do less whenever I shall believe that what I am doing hurts the cause, and I shall do more whenever I believe that doing more will help the cause." "I shall try to correct errors when shown to be errors, and I shall adopt new views as fast as they shall appear to be true views." "I have here stated my purpose according to my views of official duty, and I intend no modification of my oft expressed wish that all men everywhere could be free." In the first inaugural: "In your hands, my dissatisfied fellow countrymen, and not in mine, is the momentous issue of civil war. The government will not assail you." "I am loth to close. We are not enemies, but friends. We must not be enemies. Though passion may have strained, it must not break our bonds of affection." And in the great climax of his life, the second inaugural: "With malice towards none, with charity for all, with firmness in the right as God gives us to see the right, let us finish the work we are in, to bind up the nation's wounds, to care for him who shall have borne the battle, and for his widow and orphans, to do all which may achieve and cherish a just and a lasting peace among ourselves and with all nations."

There is something like a break in grammatical construction in that sentence. You would have difficulty in parsing it. Teachers can not parse any more anyway. Children could once parse; teachers are stranded at the thought of it now. They are adept at putting doubtful literature together; but they have nothing to do with taking great literature apart. And there is more growth in handling a little literature which moves the souls of men for generations than in handling a whole lot which can hardly last the day out. If that culminating sen-

tence in Lincoln's second inaugural had come, in ordinary work from an ordinary child, to any teacher in this state, she would have undertaken to change the form of it; and yet it is enshrined in the hearts of millions of people.

I can repeat a passage from Mr Beecher which I read and reread many times in a school reader years ago: "The cynic is one who never sees a good quality in a man and never fails to see a bad one. He is the human owl, vigilant in darkness and blind to light, mousing for vermin, and never seeing noble game." A modern literary critic, and all teachers are expected to be that as well as everything else, would discuss that learnedly for a month till the subject-matter and the criticism were both thinner than a postage stamp. "Human owl" would be held anomalous, and "mousing for vermin" trying to flatulent and delicate sensibilities. Yet that is a good sentence for the attention of modern criticism for its form and for other reasons. For one, I am glad Henry Ward Beecher could defy the soft-handed critics and the soft-headed dilettantes altogether.

I opened a school reader with a not very ancient titlepage the other day and came on a poem of which this was one of the verses:

> Children are what their mothers are.
> No fondest father's fondest care
> Can fashion so the infant heart
> As those creative beams that dart,
> With all their hopes and fears, upon
> The cradle of a sleeping son.

How do you suppose such stuff as that appeals to boys? Boys do not want to be "what their mothers are." That is the very last thing in all the world they are hungering for. Ordinarily they love and respect their mothers, very commonly much more than they are accustomed to talk about. But if they are anything like "what their mothers are" their fellows are likely to poke them under the arms and call them feminine and uncomplimentary names.

Boys are not likely to generate enthusiasm over literature which is not adaptable to the natures with which the Almighty

has endowed boys. The normal boy, the boy worth counting, the boy with red blood in his veins, loves action and the literature which describes and suggests it. How the substitution of these older lines on the flight of the earl of Dundee, from that lover of nature and of life whose monuments tower above those of all soldiers and statesmen in the squares of Glasgow and Edinburgh, would strengthen that book and inspire the boys who were allowed to hear and led to understand them:

> There are hills beyond Pentland and lands beyond Forth.
> If there's lords in the Lowlands, there's chiefs in the North.
> There are wild Duniewassals three thousand times three,
> Will cry *hoigh* for the bonnets of Bonny Dundee.
>   Come fill up my cup, come fill up my can,
>   Come saddle the horses and call up the men
>   Come open your gates and let me gae free
>   For it's up with the bonnets of Bonny Dundee.

No doubt girls with no teacher but a man are entitled to sympathy; happily there are few of them. But in the distribution of sympathy let us not forget the boys whose only teacher is a woman. And let the lion's share of pity go to either boys or girls who are subject to a fussy woman or, even worse than that, an effeminate man.

So long as present conditions continue in the American schools it will be necessary to make rules for the government of teachers in order to keep the poorer ones from doing positive harm. The weaker the system the more rules there must be and the more inflexible they must be. And rules level down more than they level up. They can not help poor teachers forward; they do keep good teachers back. They may prevent positive harm, but they also stand in the way of the vital element of inspiration in the schools.

Teachers, the great mission of your station is to inspire boys and girls, young men and young women. If that is done it matters not so much what else goes undone. You are the representatives of the greatest civilization the world has ever known, charged with the responsibility of training men and women who can realize its cost and its worth, who can enter into its pur-

poses, who can still further enrich its life, and still further extend its outposts. You can not hope to do that unless you know its history and the great history out of which it has sprung, unless you have drunk deep from the wellspring of its life. You can not hope to do it by merely following the routine of a schedule. It can only be done out of a full and sincere and irrepressible individuality of your own, which can realize that the schedule is only the skeleton and that you yourself must provide the juices and the energy for the life of the school.

It is to be assumed that you are sane enough to know that freedom is not license and that you have wit enough to do things on your own motion without violating the principles or defying the policies which are imperative to the integrity of our system of popular education. My word for you tonight is that you shall not hesitate to exercise your inborn intellectual freedom; that you shall not let rules and lectures and books and papers and devices and educational subtleties confound and take out of you any originality you ever possessed, and so make your work in the schools insipid.

The growth of the country and the political, intellectual and industrial advance have created opportunities for the young people of America which are not presented to the young people of any other land. The teachers are to make these opportunities, what they have cost and what they may lead to, apparent to the schools. The conditions which we have discussed tonight make this task a difficult one. It is one which can be met only out of a rich, an appreciative, and an active life. But if this task is met the others will take care of themselves or be the more easily performed.

Tell the boys and girls that no one can hope to be of any consequence in the world who will not work early and late and be patient, and that one who will do that can not fail. Tell the stories of successful lives. Do not stop with the assurance that every American boy has the chance to become the American president. Pupils know that the chance is too remote to be counted on. Emphasize the successes of ordinary lives in

possible undertakings and accentuate the principles on which all substantial success must necessarily rest.

Respect the different qualities of human nature and the different natures which come under your care. Development is seldom along expected lines. It is the unexpected that happens. Encourage the activities, physical, mental, and moral, and give the unexpected a chance.

Not so many years ago a boy, the son of a baker, was peddling cookies in the streets of New York. He became interested in stones; his interest became consuming; in one way and another he made a collection, took it to the Philadelphia exposition, and finally sold it for $300, the most money he had ever seen. Now the greatest jewelry house in America pays him $10,000 a year for only so much of his time as is required to pass on their purchases of precious gems, and his name is familiar and his judgment honored in every quarter of the globe.

I have a cherished friend who was born in the most humble circumstances. He might easily have remained in humble circumstances but he preferred to struggle. He grew strong through struggling. He saw but little of the schools. He got work in an insurance office, and got so he wrote a good hand and developed aptness at figures. It gained him a clerkship in the state department of insurance. We were married about the same time and were neighbors. I lived in quite as good form as he did. We served on the board of education together for years. He was thoughtful and just, affable and juicy. He became an actuary, and in time surprised every one by being appointed deputy superintendent of insurance. We came to be in the capitol at the same time, he as state superintendent of insurance and I as state superintendent of instruction. Then he resigned the office of state superintendent of insurance to accept the presidency of the New York Life at $50,000 a year, and has become a leading factor in the financial affairs of the greatest moneyed center of the world. It is needless to say that he lives in quite as good form as I do now.

Be careful about standards of value and of excellence. I am very far from being an unbeliever in or a critic of classical study. Of course it is suitable for mental discipline and contributory to culture. It is the foundation of other things. But there are limits to time. One is quite likely to have to reckon with his tastes and his conditions and consider the advantageous distribution of his time. There are other studies quite as disciplinary and culturing as Latin and Greek. One is not to be discredited because he has not pursued them. It is a question of power to do things and get results, and one who has possessed himself of that power is cultured by it. No one is animadverting upon Latin and Greek. They are all right for their purpose, and their purpose is a very great one. But it is strange that the disciples of liberal learning are so slow to see that there are other roads to great results than those of Roman or Grecian construction.

The accomplishments of science in the last fifty years are not to be compared with those of any other era. They exceed those of all the centuries put together. They are not the work of classical scholars, and they are of more moment than all the things the Greeks and Romans ever did. The heroic and unostentatious searchers in the physical, chemical, biological, and astronomical sciences have unlocked truths which widen our knowledge of matter and of life, and modify our conceptions of without shaking our belief in God.

For example, the new knowledge of disease germs does much more than afford us some help in curing diseases; it teaches us how to avoid disease and puts on us the imperative duty to control and direct individuals in the interests of society. It enters the field of sociology, and of legislation, and of public administration, and so does even more to stimulate the thinking and the doing of the whole body than it does to repel disease through the revolutionary changes it has forced in medical practice. An illustration drawn at random from any one of a score of the marvelous successes of scientific research in unlocking the truth would be no less suggestive.

I know a man, yet under middle age, who in one of the scientific laboratories of the University of Illinois, has, after long years of patient experimentation, conclusively proved not only that you can change the character of corn through care in the selection of choice ears for propagation, but also that through the taking of the kernels from particular parts of the ear you can change the chemical elements and breed into it more nitrogen or more fat as you will. There are millions of money and incalculable other consequences in that demonstration.

It can not be said too often that it does not make so much difference what one does so long as he makes some contribution to the productivity of the world. And one is liable to make quite as substantial a contribution, and gain quite as profitable a return, in cash and in culture, in the industrial as in the classical world, and in the field of applied as in that of pure science.

The west understands even better than the east does, as yet, how much easier it is to teach things and inspire boys by *doing* than by talking, and I would not dare to imply that the west is at all backward about talking. The University of Illinois has built in the last three or four years a railway test car for each of two great railway systems of the country. We operate these cars between Cleveland and Omaha, and Chicago and New Orleans, sending our teachers and our senior students to test locomotives, measure the potentiality of coals, ascertain and record defects in the roadbeds, and to do everything else which will help the companies to secure the greatest economy and efficiency of operation. The university has learned that the best way to teach railway engineering to students is to give them an all-round training and then set them to engineering railroads. And the railroads have found that the men who can only hold a job are not educated, and that educated men can do more for them than uneducated men, when it comes to the necessity of the greatest speed and when the closest saving is imperative.

Last spring the Central railroad of New Jersey, hearing of this work and needing help, applied for the use of one of these cars during the summer vacation, and we loaned them a car as well as a professor and some students, for a suitable consideration. And last fall the New York Central people, driven to desperation by the newspaper criticism of their Park avenue tunnel, and standing in danger of indictment, wired us for the use of one of our cars by an expert in trying to work out the best electric equipment for their right of way into the heart of the greatest city of the country. For a compensation still more *suitable* than that exacted from the New Jersey Central it has gone, with our professor and students, and as it vibrates between the Grand Central station and the works of the General electric company at Schenectady in the execution of its mission its beautifully painted exterior does not fail to indicate where it came from and what it is there for. There is quite as much training and discipline, quite as much culture of manliness, and quite as much advantage to the world, in pushing on the scientific construction and operation of railroads, in building tunnels under great rivers and the greatest city in the country, as in digging out Chinese and masticating Sanskrit roots.

There is no mistake about it, the schools will have to lend themselves to the industries of the nations more than they have yet done. This will have to be done even though it involves the throwing away of some old ideals and standards, for the conditions demand it, and the growth of the people will be promoted by it, and the spirit of democracy will be still further uplifted by it. In all this the west has the advantage of the east.

Encourage life in the open air, not for physical more than for mental and moral health. Let the schools smell of the ground as often as possible; it will help them to keep sane and resist the doctrinaire. Stand by field sports, even those which involve hurts. Our young people do not have to struggle any too much or assume any too many risks. There is more training for the real demands of American citizenship through the

rush line of a 'varsity football team on one cool October afternoon than in some 'varsity classrooms in a whole semester.

Illustrate and enforce the claims of public service. We are beginning to learn, what we have never seemed to realize before, that our public life must sustain assaults, and that government is more a burden than a pastime. Tell pupils about this. Talk quite as much of the responsibilities and duties as of the rights and privileges of citizenship. Let them know something of what men have suffered to establish order and create opportunities for boys and girls.

Last spring a little party of American boys, hardly beyond the college age, came sailing through the Golden Gate and landed on our western shore. They had been, at our instance and as our representatives, following the streams and threading the jungles on the other side of the world, to establish the order which the flag of the Union signifies and so confer on other millions of people the opportunities of freemen. 15 such boys had fallen into ambush a year before. Two were killed, two were mortally wounded, and two others seriously wounded. The living were placed for execution. McDonald, mortally wounded, begged a comrade to hold him up in the death line that he might die like a man. Gilmour demanded that the cowards should remove the bandages from the eyes of the men that they might die like American soldiers. Poor McDonald fainted and died in Walton's arms. At the supreme moment the insurgents exchanged death for torture and for 10 months it was inflicted. Again the order was issued for execution, and again the rifle blast was stopped by fear of retribution. Then a miscreant general directed that they be murdered, and the officer commissioned to perform the crime quailed and saved the hero band. Then other gallant boys, disciplined to the darings and the hardships of United States regulars, following for weary months with little sleep, and little food, and little encouragement from the far away homes across the seas, overtook their starving and staggering comrades, put the strong arm of

the Republic about them and brought them back to an appreciative and a grateful land.

Let these things reach the pupils, and tell them that it is the business of men to support government and not of government to support men, so that they may catch an early glimpse of the great fact that organized government is a costly heritage and that its maintenance and its transmission are at once a weighty burden and an heroic duty.

Regard the higher learning. Nothing else can break out the roads. Nothing else can lift the schools to higher planes and yet better work. But do not let the conceptions of other generations determine conclusively in what fields the higher learning shall advance. Encourage research, whether capable of application or not, in all fields, but insist that such work as is set in motion in the elementary and secondary schools shall have some relation to American life.

Remember that there is a democracy of learning. In that democracy selfishness is treason, and meanness defeats itself. The success of one man helps every other man. The growth of one institution helps every other institution which is moved by the educational spirit or entitled to much of a place in the educational world. There is not only room for all institutions and all undertakings in the universe of learning, but the success of each depends, not on pertness and overreaching, but on the magnanimity it extends to all who are struggling, and the relations it sustains to all organized effort to promote the common interests of men and women.

The Divine Power creates and directs civilizations. Schools are the instruments of civilizations. The activity and the accomplishments of pupils spring from inspiration. If the teacher would be of real service to pupils he must inspire them. If he would enrich their lives he must have a life of his own with riches in it. He must know about the intellectual and spiritual and industrial evolution of his country and his age; he must think logically; he must stand for what he thinks and feels, steadily and heroically.

If he can draw out of the great reservoir of world experience, if he can believe that there is a divine law operating in the world advance, if he can take hold of youth and fire souls with desires, he will generate natural, cheerful, buoyant, courageous life. The spelling will in time be correct enough, the problems demonstrated with exactness enough, knowledge of things will accumulate, respect for hand and mind labor will enlarge, powers will strengthen, courage will gather, and a greater number of healthful and ambitious spirits will push on the higher interests and enrich the nobler life of the world.

Friday morning, 27 December

TO WHAT EXTENT IS IT POSSIBLE AND PROFITABLE TO MEET THE REGENTS REQUIREMENTS FOR INDIVIDUAL LABORATORY WORK IN PHYSICS?

Irving L. Bishop—In his letter asking me for a paper before this body your president stated the topic which he wished me to discuss in the following words: "Is it worth while and is it possible for high schools to meet the regents requirements for individual laboratory work in physics?" Later the title was changed to the form in which it now appears on your program. The first proposition of the original question is, however, so pertinent to the matter before us that I hope I may be pardoned if I spend a few minutes in its consideration.

It is a well established principle of pedagogy that the mind gains a real and adequate knowledge of things only in the presence of the things themselves. This is particularly true in the case of children, including those of high school age, whose knowledge of external things is largely obtained through the senses. The greater the number of avenues through which knowledge comes, the more lasting the impression. Laboratory work, bringing the pupil into direct contact with facts through experiment, offers a logical and natural means of education. All his senses are brought into use. He handles apparatus, he observes, he compares, he draws inferences. Thought springing from such a source has a vitality in nowise to be

derived from mere book learning. On the other han become less and less vivid in proportion to their ren from the facts on which they are based. With vagueness comes turbidity of thought. For example, a pupil leai a book the usual method of obtaining specific gravit days after he remembers that one divides the weight of in air by the loss of weight in water—or the reverse—l sure which. In the crucial test of the examination h down whichever phase happens to be uppermost in h doubtful of his answer, yet knowing that he stands chance of being right. If he fails, he consoles himself thought that it is impossible to guess with accuracy ev and hopes for better luck on the next trial. But if he h tained for himself by actually weighing, the specific gı a marble or a pebble, the principle becomes a reality that time on specific gravity instead of being an abstr: is as clearly understood as a baseball score.

Therefore I answer the query, "Is it worth while?" l ing that in my judgment the laboratory method is the teaching physics, and whatever is best is worth while.

"Can I meet the regents requirements for individua tory work in physics?" is a question which every teacl answer for himself according to the conditions existii school. Laboratory work requires for its essentials a room, apparatus and a teacher. It is reasonable to that the best results will be attained where all three are specially adapted to the purpose; but in many—pe most—schools one or more of them falls below the ide: ard. The room may be small, inconvenient or occupi part of the day by other classes; the pieces of appar: in number or old-fashioned; the teacher may be inexp in manipulation of apparatus. Still, lacking any o these, if the teacher has a lively interest in the subject desire to do his work well, a fair degree of success attained. I will briefly discuss the essential factors order.

The room in which the laboratory work is to be done should be well lighted and should have a maximum working capacity of 20 pupils. Half that number is all that a teacher should be asked to oversee at one time, and provision for 10 will generally be ample. If the classes are larger they can be worked in sections. In city high schools it is best to devote a room solely to physical laboratory work, and in all cases it should be free from the corrosive fumes of chemicals which ruin apparatus. If city water is available, a tap, sink and draining board are desirable. If not, a five or 10 gallon kerosene can provided with faucet, filled with water, and supported at a convenient hight will answer the purpose of water supply very well. A pail or earthen jar will suffice as a receptacle for waste. Heat may be obtained from gas or lamps burning wood alcohol. The room must also have tables or benches at which the pupils may do their work. The essential of these appliances is that they shall be horizontal, substantial and as free from tremor as possible. They should be provided with arms or supports for suspending pendulums and similar pieces; and it is a great convenience to have the supports movable so that they can be adjusted at convenient hights. Varnish and polish, while they add to the appearance of these pieces, are expensive, unnecessary and often undesirable. Whether benches or tables are better depends largely on the lighting of the room and the other purposes for which it is used. Undoubtedly the simplest, and in many respects the best, device is a shelf about 2 feet wide, made from 1½ inch pine, firmly supported at a convenient hight on the best lighted sides of the room. The space below may be utilized in part by drawers for storage, while supports for suspending apparatus are readily attached to the wall and are gratifyingly free from tremor. When the hight of the windows interferes with proper lighting or for any reason the walls of the room are not available, tables may be used. If built specially for the laboratory they should be constructed with due regard for solidity. In case economy is necessary plain

unpainted kitchen tables costing from $1 to $3 each will answer the purpose very well.

How the fixtures and apparatus shall be placed is of course a matter to be decided on the spot by those who have to use them. A convenient arrangement where the room is to be used both for laboratory and for recitation is to put the tables or benches along two sides of the room, the cases for apparatus on the third and the blackboard behind the teacher's desk on the fourth. This leaves the center of the room for seats and general recitation purposes. The advantage of this arrangement lies in the additional flexibility which it gives to the teacher's work. He may use the whole period either for laboratory work or recitation or he may divide his time between them as he chooses.

The second essential, proper apparatus, presents the most formidable obstacle of all to the introduction of laboratory methods. In chemistry, almost all the ordinary manipulations may be performed with the test tube, a perforated rubber stopper, a few fruit cans, and pieces of glass and rubber tubing. In physics many experiments require special apparatus which is good for the particular purpose and no other. The great fault with the equipment of many schools has been that the money which would buy a large number of pieces for students' use, has been expended in the purchase of a few costly show pieces of limited utility, which the student is never allowed to touch at all. I suppose that there is no collection of physical apparatus in the state which does not contain an air pump and some form of static electric machine. While I would not be understood as saying that the pieces in question are not useful, I wish emphatically to voice the heresy that one may have an excellent working laboratory without either. Further than that, the money might be better expended in the purchase of cheaper apparatus which in the pupils' hands would cover a much wider range of principles.

Laboratory work means shifting much of the apparatus from the hand of the teacher to that of the pupil. It means also,

quantitative work in the place of qualitative. With this change have come simpler but more accurate implements with wider application and cheap enough to be placed in the hands of high school pupils. In fitting up a working laboratory the greater part of the sum at our disposal should be invested in apparatus of this kind. Remembering that varnish and polish add to the cost but not to the efficiency, pieces should be selected solely with regard to their price, durability and fitness for the work. "Will it illustrate the principle and will it stand use in the hands of pupils?" are the two questions which decide whether a piece is cheap or otherwise. If it will not do both, it is dear at any price. If you have only a small sum to spend, confine your purchases at first to apparatus illustrating elementary physics. Buy a few pieces of a kind and get as many kinds as your appropriation will permit. Next year you may buy more to supplement what you already have, and perhaps make a beginning on advanced physics. While by this method your laboratory will not at once spring fully equipped into being, it will make a healthy growth and will have only those pieces which experience has shown to be usable.

Much has been said and written regarding the manufacture of apparatus by teacher and pupil. In a few cases it is done and well done, with added interest and benefit to all concerned. Any physics teacher should be able to saw a piece from a board, to drive a nail or to use a file. He ought also to be able to adapt common household utensils to the purposes of the laboratory. But the ability to construct a serviceable, workmanlike product is extremely rare. I can count on the fingers of one hand all the physics teachers of my acquaintance who are even moderately skilful in this line. As a rule, improvised apparatus is like improvised poetry: creditable under the circumstances, answering the immediate purpose and not adapted to future use. Even if the teacher has the requisite skill, it is generally poor economy to use the time of a $10 a day man to make a 10c article. If the physics class includes boys with a knack in handling tools, the teacher may direct their energies, with profit, to

the making of usable pieces. What I wish to emphasize is that neither teacher nor class can be, or ought to be, expected to make the tools with which they do their work. With apparatus as cheap as it now is such a course is also unnecessary.

I have not the time, nor is it my purpose, to specify what apparatus is best in all cases. If the teacher is wise he will select such pieces as supplement his present stock or are adapted to the text he is using. A comparison between two ways of spending the same money will, however, be instructive and at the same time illustrate what I have previously said. Referring to the air pump and static electric machine with accessories, a very modest outfit will cost as follows:

Air pump	$30	
Magdeburg hemispheres	6 50	
2 gallon receiver with cap and stopcock	3 75	
1 gallon and 1½ gallon receiver	3	
One hand-glass	1	
		$44 25
16 inch Toepler-Holz machine	$40	
Insulating stool	3	
Leyden jar, quart	1 50	
Discharger	3	
Aurora tube	7	
Two Geissler tubes	3	
		57 50
Total		$101 75

This is considerably less than is sometimes spent in the illustration of the same principles and the apparatus is of very little use elsewhere.[1]

Let us see what this sum would do toward a laboratory equipment. Individual apparatus for the first 25 experiments of the National physics course costs a trifle less than $7 for each

[1] In a secondary school with which the writer is acquainted, the apparatus for illustrating static electricity cost upward of $250, while the air pump and accessories cost $120 more.

student.[1] Similar material for the first part of the Hall and Bergen book, 29 experiments, costs a trifle more than that—$7.22, to be exact.[2] The $100 expended in the air pump and electric machine outfits would equip 14 students with sufficient apparatus to perform independently nearly 30 of the 35 experiments required by the regents for the first term's work. Much of this apparatus is also available for subsequent experiments in the second part. The advantage gained by purchasing the simpler material is too obvious to require comment.

In noticing a particular group of experiments I do not wish to be understood as advocating them in preference to others. Probably every teacher will have to fit his laboratory to meet his own needs. The Hall and Bergen book introduces in the first term's work several experiments on light. Most teachers, following the plan of the texts in their hands, prefer to teach the subject of light by itself. This is my experience, and the apparatus for illustrating the work under "matter and mechanics," some 40 exercises, has cost as follows:

Franklin or Harvard trip scale	$5
Sliding Vernier calliper	2 50
Chatillon spring balance, with index, 15 kilos	1 25
3 Chatillon spring balances, 250 grams, at 55c	1 65
Meter stick	25
Boxwood rule, 30 cm	10
Graduated wooden prism 1 x 1 x 30 cm	10
2 pulleys, single and double in blocks	66
Lead balls, perforated, for pendulums	10
Specific gravity flasks, 50 cm	60
Y tube apparatus for specific gravity	83
Mercury gage, S form	05
Boyle's law apparatus (tube only)	75
Total—each student	$13 84

[1] Hall & Bergen. Textbook of physics. H. Holt & Co. 1897. p. VI. National physics course. L. E. Knott Apparatus Co. Boston 1901.

[2] Apparatus for the Hall and Bergen book. L. E. Knott Apparatus Co. Boston 1901; also Catalogue no. 10. Ziegler Electric Co. Boston.

In addition, the following articles were furnished for gener use, estimating for a class of 12:

2 Brown & Sharpe wire gages at $2.50	$5
4 iron clamps	2
2 pounds mercury	1
Glass and rubber tubing	1
Brass and copper wire	
Alcohol	
Metric graduates, 60 and 250 cc..................	1
Total	$11

It will be seen that the pieces in this group are more expe sive, raising the cost for each pupil to nearly double that of t previous lists. To offset this many of the pieces are us repeatedly in the advanced work, and the cost of apparatus f that purpose is so much lessened.

Of more importance than fine apparatus or a convenie laboratory is a well trained science teacher. Concerning bo teachers I have nothing to say; they undoubtedly exist, but th are entirely too few to meet present or prospective demand Deftness in manipulation is usually acquired by practice. Ma of the colleges and, I believe, all the normal schools in this sta are now training their pupils in the art of handling apparatu From their recent graduates many excellent teachers may had. But a considerable number of those now teaching physi studied the subject in the higher schools when laboratory wo formed no part of their training. The consequent lack of sk in handling apparatus makes many of these timorous and dela the introduction of experimental methods. On the other ha there are many from this class who have learned by practi to do the necessary work and to do it well; many, too, wl with adequate apparatus and opportunity would soon attain high degree of proficiency. The teacher who is well ground in principles, resourceful, and who has a liking for the wor has in him the elements of success. It should be remembere

however, that the teacher of physics must not be overloaded with duties outside his department. It takes time to prepare experiments, to keep apparatus in repair, to oversee laboratory work. The failure of school boards and superintendents to recognize this is often responsible for overworked teachers and unsatisfactory results.

The management of the laboratory is also a problem worthy of brief consideration. It greatly economizes the pupil's time to have the apparatus in readiness for him when he enters the laboratory. In many cases an experiment can not be otherwise completed within the alloted period. Where there are too few pieces of apparatus of a kind, two pupils may work together, or two or more experiments may be in progress in different parts of the room at the same time. Notes should be kept in pencil during the course of the work, shown to the teacher on leaving the room, and be afterward neatly written up in ink. During working hours the laboratory should always be under supervision. When the class is too large or the teacher is necessarily absent, pupils who have shown marked proficiency in previous classes may be put in charge of a working group or, temporarily, of the room. They are usually pleased with this mark of the teacher's confidence and make a strong effort to merit his esteem. The added responsibility is a good thing for the student and very often enables the class to accomplish much more than it otherwise would. The practice of utilizing students as assistants in preparing experiments and in getting out and taking care of apparatus not only helps the teacher but fosters in the pupil an interest in the subject, and stimulates him to widen the scope of his knowledge.

Therefore, my reply to your question is that any high school which can provide an earnest teacher, a suitable room and at least $100 for the purchase of apparatus may make a profitable beginning of laboratory work. Once begun there is little danger that the laboratory method will be discarded for any other.

Prin. Robert K. Toaz—The answer to this question will depend to some extent on the viewpoint. The principal of the large high school will have different sides of the subject to consider than will the principal of the small union school, and the teacher of science is apt to look at it from a different standpoint than the principal. The science teacher sees the great benefit to be derived from the study of the subject, while the principal, though he may see the advantages quite as clearly, must compare the relative equipments and needs of the different departments of the school and quite often with $1 to spend when he needs $5 or the services of two teachers where three are needed, must decide when to spend the money and use the services of the teachers so that the greatest advantage shall accrue to the school as a whole.

However, whatever viewpoint we take, most of us will agree in these fundamentals: that the main object of teaching a science is the same as that of teaching other high school subjects viz, the development and training of certain faculties; that this object is in large part defeated for lack of the time element, if one year at least is not given to the study of a single branch of a science or to that of two very closely allied branches, such for instance as zoology and botany; that this desired result can not be accomplished without individual laboratory work; that this side of a pupil's training and development can only be obtained by the study of a science and that development along these lines is essential in the education of every person.

The subject of the relative values of physics and other sciences has been discussed thoroughly and the consensus of opinion seems to be that if only one science is to be taught physics has an advantage over any one of the others both from the nature of the subject-matter and from the fact that quantitative as well as qualitative work can be done from the beginning. Another advantage not to be overlooked is the fact that the majority of teachers who are not specialists are perhaps better prepared to teach physics than any other science.

As regards the adaptability of the regents laboratory course to the facilities of the school, my understanding of the course is that it is not meant as an arbitrary outline to be followed in detail by every teacher, but substitutions may be made to suit individual preferences. However for the majority of schools very little alteration would be necessary or advantageous. As for the number of periods of laboratory work required, the minimum of 70 periods seems certainly little enough for the accomplishment of any permanent results. And if it is remembered that every pupil is not expected to cover the entire ground in detail, I think the course does not cover too much. But even though all the advantages of laboratory work may be clearly seen, the principal of the small school is confronted with the obstacles, lack of money, time, and room.

One disadvantage of a course in physics is that its laboratory equipment costs more than that of some of the other sciences. But this obstacle as well as the others becomes less formidable when we consider it as something that must be overcome. It is a great mistake to suppose that a completely equipped laboratory is necessary or that an expensively furnished one is desirable. A very few simple pieces of apparatus will do to start with, and they can be gradually increased without causing too great a drain on the school purse. Even where the money is forthcoming it is a question whether costly and complicated pieces of apparatus have their proper place in a high school laboratory. They are apt to be looked on as curious toys, while the simpler and cruder the contrivance the less the attention is distracted from the principle to be illustrated. But still a laboratory costs something and the question has been asked whether it is a fair distribution to spend this money for the benefit of so few pupils when the needs of a greater number could be relieved by the same amount used in another department. The affirmative answer has been given in every school where we find one teacher spending his time teaching a class of three in Cicero, while another for a smaller salary is teaching a class of 50 in one of the lower grades. Even considered

from an economic standpoint money invested in this seemingly unfair way has brought in greater returns to the community.

The obstacles hardest to overcome usually are lack of time and room. Even when the time can be found it seems unfair to impose extra work on an already overburdened teacher specially when that teacher happens to be ourself. The regents requirements state that the teacher is expected to be present during the entire time of laboratory work; but it is possible for a small class to work one period under the supervision of the teacher and be left alone for another period to finish a certain amount of work, doing this without disadvantage to themselves. I think the regents should not be too arbitrary on this point. In some of our smaller schools we could cut down the number of classes with a decided advantage to the work of the school. We are apt to try to cover too much ground instead of being satisfied to do a few things well. Though a believer in the elective system, I think that the time and energy of the teacher and the money of the community is often wasted to satisfy the whim or caprice of one or two pupils. So we sometimes teach two classes of history when one would do as well, or two or three classes in different sciences where better results could be obtained by combining all into one and teaching that one properly.

It is perhaps harder to make room than to make time. In some schools a corner in the cellar is partitioned off for a laboratory. Where this is not possible movable chairs might be substituted for the benches in the recitation room. These could be moved out of the way and a couple of small tables brought out for use during the laboratory period.

A number of schools, no doubt, will be unable to pursue this course in physics on account of some of the obstacles mentioned or others. I have tried to emphasize the fact that the obstacles are fewer and less formidable than might appear at first sight, and that every high school principal should consider it one of the prime necessities of his school to have a laboratory course in physics at least as good as the one outlined by the regents.

Prin. Julius S. Kingsley—The regents syllabus of 1900 was a great departure from that of 1895. The greatest advancement was in the lines of laboratory work. For years our colleges have either refused to accept the science work done in the high school or have received it with regrets. Ordinary high school science was an insult to honest scholarship; an excuse for the poor or lazy student. This fact of itself brought disrepute as well as injustice on this noble branch of human learning. To meet this great need the authors of the new syllabus wisely strove. They increased the requirements in laboratory work to such an extent that it seemed almost appalling to many of us. Many things which seemed impossible at that time have since been found possible and even advisable. A syllabus which would require what all could easily meet immediately, would be a calamity. The object of the syllabus must be twofold: first, a present guide for all teachers; next, a guide for the future. We think the present course has met both of these requirements. Credit is given for students passing physics with a trifling laboratory experience, if they answer correctly the required number of questions on the question paper. To encourage laboratory work the student is favored still more if his school is approved and his laboratory work is satisfactory. Under these conditions both the poorly equipped school and the school with a model laboratory have a chance: the one for abstract, the other for concrete teaching; the one for analytic, the other for inductive knowledge.

There is no longer a need of argument to convince any one that laboratory practice is essential. It is now generally conceded. How much laboratory practice? How much of the text-book? How to present the work in the laboratory? These are the questions.

The crying need of the age is motor education. He who harnesses the activities of youth and successfully uses the results in subjective teaching is as useful to education as he who harnessed Niagara was to commerce. The great schools of the cities have solved this problem by manual training, but we of

the country, who have no immediate hope of this, must find our remedy in the laboratory.

I believe in having the regents fix a standard for approved laboratory work and in having them fix it high; high enough to encourage the schools of the state to higher attainments, to incite school boards to furnish more and better apparatus and more commodious rooms in which to place it. And yet the standard should not be fixed so high that it can not be reached by every earnest and progressive school within a reasonable length of time.

Some schools may complain because they are not approved. To such the answer is and should be: "You ought and can reach a higher standard." Some schools desire to be approved to gain credit on the examination. I believe if the regents made any mistake at all it was in giving credit on examination for laboratory work. The distinction ought to have been made by raising the requirements for those schools which were not approved within a certain length of time. If schools not approved can pass an examination when no per cent is allowed for laboratory work, certainly those schools which are approved and have fine laboratories ought to pass with a much higher standing.

It is possible to meet the present requirements in respect to individual laboratory work because it is already being done in many of the smaller schools of the state and can be in all.

What is laboratory work? Some think it is demonstration, for demonstration has been and still is largely used instead of individual laboratory work. Demonstration is simply a lecture with concrete illustrations. It is no more worthy of being called laboratory work than a stereopticon lecture. For a teacher or a few selected pupils to perform an experiment before a class is a failure to accomplish what is intended. The purpose is to cultivate observing powers and independent thinking, neither of which is done in this way. An original thought gained by a student in performing an experiment is worth a thousand grafted ones which some teacher has gathered from some text on physics.

We need an emancipation in the schoolroom. The teacher has been tyrant too long, but mark, I plead for freedom not for anarchy. The student who has learned to think, whose mind knows his hands and whose hands recognize and obey his mind has more education than an encyclopedia. The trouble in the past has been that the student has not been allowed to think for himself. He has had no chance to become acquainted with his own hands. He has been far better acquainted with his instructors than with himself. The pupil has lacked skill owing to lack of practice. Knowing and doing are two different things and unless learned together must be learned twice.

Some do not believe the text should be used at all. I do. There should be laboratory work enough to teach the pupil how to think, how to observe, how to construct. After this is accomplished the text should be thoroughly studied. Teach the student how to think, then how to work. After this teach the science up to the present time thoroughly, so that the pupil, rounded out in all phases of the subject, may launch out into practical, original, up-to-date investigation.

William M. Bennett—The topic under discussion resolves itself in my mind into three questions concerning the regents outline of laboratory physics: 1) to what extent shall it be given? 2) how is it possible? 3) how is it profitable?

A comparison of the regents outline of this subject with any widely used manual will show that the regents syllabus gives very conservative requirements for a year's course. This is proper and natural since the course must be adapted to the weaker schools of the state and can not be a standard for the work possible for the more favored. I believe the course is planned for every high school in the state to teach physics in this way, and that it is possible for all schools to meet the requirements is not, in my estimation, open to argument. Furthermore, something of a premium is placed on the laboratory course by the offer of 20 credits on examination for laboratory notebooks, leaving the pupil to gain but 55 more for a passing mark.

If it be granted then that the laboratory course sho be given—and I have something more to say of i there are three requisites to make it successful: teacl time; and the greatest of these is the teacher. If b chance he belongs in the second category, then the s of that curriculum is worse than any other. The is even more essential in science than in any other study. Subjects that exercise the memory, subject largely informational, or subjects that exercise the deduction may be grappled with and mastered u generalship, but the development of inductive reasoı is the special province of a laboratory science presen pitfalls for the unwary that the leader must know th

With the right teacher the question of possibility answered, for the ability to bring things to pass i qua non of a scientist. And the physics teacher wl use hammer and saw, if necessary, has probably made in his calling. Certainly he lacks the very manual d is a part, at least, of his business to develop. Th of apparatus is frequently regarded as a difficult or I think this notion has its origin in a misapprehens nature of the apparatus needed. In memories of s of 15 or 20 years ago we can recall the physics teac his class, surrounded by the massive show pieces stituted the museum of every well regulated acad these he juggled and wrought black magic general to our complete mystification and often to his own fear. The apparatus used specially for lecture demc is expensive. But it is neither necessary nor even d put such apparatus in the hands of the pupil. A good year's work is possible without supplying the pu spectroscope or a reflecting galvanometer, for examp all, there is no one experiment nor any one topic not be supplanted by some other of equal value, and t outline offers abundant room for variation. The te knows just what he wants, what he is going to do v what good will come to the boys and girls from the

who can state this clearly to his board or committee will generally get what he needs, if not quite all he wants.

The third requisite, that of time, is somewhat more difficult to speak of. I fancy the mere mention of the word, in a gathering of teachers such as this, begets instantly a defensive attitude, and we are all on the alert for trouble. It is not necessary, however, to deprive any other department of its time to improve very much the science work. That Latin, for instance, has four years for specialization is a good fortune owed to inheritance from the middle ages. If science seems now to have less time in which to prove itself an essential factor of education, that is a misfortune which, I predict, will not continue long enough to become a fault.

It is perhaps fair to assume that every pupil who completes the high school course devotes at least one year to science, and many take three or four years. But in many of these cases the time of both teacher and pupil is so parceled out in fragments through the whole list of sciences that nothing is done well. The motto for all science teaching is "not how much, but how well." It is said that there are schools that form classes in every one of the list: physics, chemistry, botany, zoology, geology, astronomy, physiology and physical geography, and are rather longing to corral one or two more under the name of meteorology or something of the sort, just to give a good finish and get two more counts. And one teacher does the whole trick! If the teacher is ever found who is qualified to do it, he will be identified as a deposit of phosphorus in the strata of the Tertiary period. His species is certainly extinct. If the arrangement of such a course—Heaven save the mark—is an attempt to imitate the Latin list of grammar, prose composition, Caesar, Cicero and Virgil, then the aims and value of science study are misapprehended, for the two cases are not parallel.

I do not believe that the majority of high schools are justified in offering more than three or four sciences. The pupil who has one year to spend in science and who spends it on the laboratory study of but one, gains far more than the pupil who

attempts a smattering of information about two or three. I matters little which sciences are given, but the method o presentation is all important. Probably a majority of educa tors agree that physics is the most generally valuable. I shal forbear to suggest the other three, in the first place, because am of a peaceful disposition, and secondly because it matter very little anyhow. The argument that if the pupil does no study this particular science or that he will leave school withou knowing that 66 Cygni is a double star, or what are the ev dences of life in the Archaean rock, does not take account o the aims of science study. To recount these proper aims wil be a repetition of what has been often said before, but reitera tion may serve to emphasize.

I believe the purpose of science study is threefold: informa tion, manual training and the development of the power o inductive reasoning with all that it implies of observation an classification. Only the last of these three aims however, i the special province of a science study and it is therefore th most important. But, on the other hand, the textbook stud of a series of sciences lays sole emphasis on gaining informa tion, which ought to be, after all, only a subordinate an secondary end. Such textbook study is nearly worthless fo gain in power of induction, while proper laboratory study give the ability as no other subject can. This wasting of time o a smattering of science facts instead of giving it to the attain ment of the true scientific spirit has compelled real science t strive hard and long for a tardy recognition of its equality i the curriculum of culture.

To sum up briefly, the ideas to be specially emphasized ar these:

1 It is possible to meet fully the requirements for laborator work.

2 Of the three requisites, teacher, things and time, only tha of time presents much difficulty.

3 Often the necessary time both for pupil and for teache may be gained by cutting down the number of sciences, wit great gain in the value of those given.

4 Which particular sciences are chosen matters little, but the development of the power of inductive reasoning is of great importance.

5 This result can be gained only from laboratory study.

Finally, science work must be intensive, not extensive. Call this specialization if you like, but education today means specialization. The educated man is the man who knows one thing well. Such specialization is not narrowing. It broadens by giving to the individual an axis of interest to which broad lines of interest may relate.

Nor is such study second to any other in the attainment of culture. Culture has been defined as that abundant knowledge that gives broad sympathies, and I believe the classics possess no exclusive formula for the attainment of this end. They are a most valuable and indispensable factor to that end. A well ordered laboratory science is a factor equally valuable and equally indispensable.

Inspector Charles N. Cobb—I just want to say that we have received a complaint from a few of the principals in the state that the laboratory requirements in physics were tending to drive the study of physics out of the schools. I can not say what the figures for this current school year will be till later—we can tell something about it after the January examination—but for the year which closed last June I am able to say that more papers were claimed in both parts of physics, that more were allowed and that more received honors than the year before. The increase in papers claimed was 353, in the number allowed 102, in the number receiving honors 154, indicating not only that there are more pupils doing the work but that they are doing it better. There was a falling off in the number of papers examined in physics, part 1, to the extent of 75. My impression is that this was chiefly in the case of persons who came into the New York city examinations.

George M. Turner—I did not expect to say anything on this subject this morning and came in too late to hear Mr Bishop's paper.

I agree with Mr Bennett that the difficulty chiefly is that of th teacher. If the teacher has the right spirit toward the subjec of physics he will do the work whether or no—school boards t the contrary. As to the apparatus, that also depends on th teacher. I have worked in schools where the apparatus wa very scarce and I have worked in schools where the apparatu was more abundant; and I am satisfied that if the teacher ha a mind to get apparatus there are ways and means to get i about which the student knows nothing but which the teache can discover for himself. It is an advantage not only from th standpoint of the board of education but from the standpoin of use to the pupils themselves, to make the apparatus. Fre quently have I found it to be the case that the pupils are no only willing but glad to assist the teacher who knows what h wants in the way of apparatus. Often does it happen that th fathers of some of the boys are carpenters, or blacksmiths, o electricians, even in our smaller towns, who are only too gla to help their boys help the teacher; and many times pieces o apparatus which would require quite an outlay by the boar of education can be supplied by help from the boys and thei fathers, to the great advantage of the school.

I heartily approve of laboratory work. I am free to confes that this last year has been rather an eye opener to me fron many standpoints. I have watched with great interest th influence of the offer of the regents to open this matter to th pupils for consideration and have watched their interest i working for that end; but I have noticed that the main aim o the pupils has not been to see whether they could get the credit but whether they could get something out of the laborator work which would be of help to them from their own standpoint and I have had many pupils who were willing to come in and d the work knowing that they could not get the regents counts. think they do as good work as the others. These things lea me to believe that laboratory work is a thing that has come t stay and which we can all feel assured will help us out in ou physics.

THE EDUCATIONAL EXHIBIT AT THE ST LOUIS EXPOSITION OF 1903

BY DIRECTOR HOWARD J. ROGERS, DEPARTMENT OF EDUCATION, ST LOUIS EXPOSITION

In addressing this audience I am glad that I am not under the necessity of demonstrating the value of an educational exhibit. I am very glad to state that there is much less necessity of this before any audience than was the case even two years ago. The value of an educational exhibit is exactly the same as that of an artistic or a commercial exhibit. The value of any well ordered exhibit lies in the opportunities of comparison which are afforded, the investigations which are inspired and the friendships which are engendered. We often refer to the benefits which have arisen from educational exhibits in international expositions, such for example as the creation of the South Kensington museum as a result of the Crystal Palace exposition of 1851; the introduction of manual training and industrial drawing into the schools of the United States as a result of the Centennial exposition of 1876; and the reorganization of the primary instruction of France as a result of the exhibit of the French schools at the exposition of 1878. But so marked has been the advancement in the minds of the people during the last 20 years of education as a profession that it has tended to familiarize the general public not only with the idea of an educational exhibit but with the further idea that such an exhibit is the foundation of all exhibits at an international exposition.

The theory on which the classification of exhibits for Paris in 1900 was founded, and on which the classification for the St Louis exposition in 1903 is founded, rests on the interrelation of the powers of the brain and hand and the relation between the educational methods of a country and its industrial and commercial development. This idea has been of slow growth in this country but has been accepted none the less heartily when once it has been received. On this account education is

given the place of honor (group 1) in the classification. T efforts which were made at Chicago in 1893 to find first a bui ing suitable for the educational exhibits and secondly a suital location for the building are matters of record and well kno to many of you. No such question has arisen with reference the St Louis exposition of 1903. There has never been any otl thought but that one of the finest buildings at that expositi should be placed at the disposal of the educational interests this country and of the world, and that it should be placed one of the most accessible sites of the exposition. This h marked the spirit of the St Louis directorate from the first

I think I may take just a moment here to speak of the expc tion in general and to give four or five reasons why that ex] sition should be a great international success. In the fi place it is better financed than any other international expc tion which has ever been held. It has $15,000,000 at tl moment to draw on and not a string is tied to a dollar of Chicago had $11,000,000, Paris had $12,000,000. In the case St Louis, $5,000,000 comes from the government, $5,000,000 fr the people of St Louis and $5,000,000 is a subscription bo issue. In the second place the site is larger than that whi has ever before been devoted to an international exposition. covers about 1000 acres in the western half of Forest park the suburbs of St Louis, is of great natural beauty, and capal of being transformed into wonderful scenic effects. In t third place the spirit of loyalty which animates the directors the St Louis exposition and of the people of St Louis can i be overestimated. You can not ignore sentiment in an expo tion of this kind; it has been the underlying factor in all o great expositions. Fourth, the morale of the exposition is be of the very highest character. It is to be an exposition exhibits. It is to be educational and instructive and the aim that no matter in what science, what art or what industry man may be interested, he can find in the St Louis expositi the very best that the world offers in that science, that art that industry, placed side by side from every nation in t

world, ready for comparative study; and he can also find a retrospective exhibit showing the development of that science, that art or that industry. It is a mistake to place an exposition on any lower plane than that. Lastly we have the experience of all the other great expositions to guide us, and this is valuable not only in teaching us what to do but in teaching us what not to do. Viewed in the light of these facts it does not take the spirit of prophecy to predict that a great success lies before the international exposition at St Louis in 1903.

The relation of education at the present time to the industrial development of the United States and the consequent interest in educational exhibits is of the utmost importance. We are about to enter on a new age. I would scarcely call it a scientific age, because that term has been appropriated by the last half of the last century, but it will be an age where the development of science will predominate. Hitherto we have restricted the term "age" to a single phase of development in a country, viz, the Elizabethan age of England, the Augustan age of Rome, the renaissance of western Europe, but this is no longer possible. The world has ceased to be a vast area of unrelated peoples. The demands of society and the results of ingenuity have overcome the obstacles of time and space. The world has been transformed into a great community with common ties, common obligations and common purposes. Henceforth we may go forward or we may go backward but we will go together, and the part which every nation plays in the great family of nations depends on its genius, its enterprise and its traditions. The 20th century will be the scene of a struggle for commerical and industrial supremacy. The battle is now on and so marked has been the success of the United States in the preliminary skirmishes that other nations have so to speak paused to inspect the field, to look over their equipment and to make a comparison of methods.

But this comparison in order to be reliable must go below the surface. It must thoroughly comprehend the spirit which animates our institutions; it must comprehend the traditions left

to us by our forefathers; but more than all it must compreh and thoroughly realize the educational system which under all our institutions and which fits our youth for their ba with the world. This is the crucial test; will a nation wh thousandfold phases of industry are maintained by labor trai on broad lines and general principles be more effective tha nation whose labor is trained in a groove, taught to do thing well but never taught the correlation between that thing and the economy of the whole? That is the differe between the free education of Europe today and the pu school system of the United States. We believe that supremacy of American methods is due to the liberal trair received in our public schools rather than to any highly spe ized training. As some one has tersely put it, every chil the United States is trained with the possibility of his day becoming the president of the United States. Exactly contrary is the case in continental Europe today. There child is destined from his earliest years to follow the occu tion of his father. His education is based entirely on theory and as a result while they become manually the m expert workmen in the world in their own particular trad craft, they have lost sight of the relation of that trade or c to other industries and never have gained that power of ini tive which is essential to the best progress of the individ or the state.

Two or three examples come to my mind this moment wl are pertinent here. You may have noticed a statement in daily press that the minister of commerce and industries France, M. Millerand, has recommended that in one or tw the great industrial and commercial centers of his coun schools of observation and drill be established on Ameri industrial methods. To these schools shall be sent every y two or three hundred French youths for instruction. At close of the Paris exposition of 1900 the director of the dep ment of machinery for the United States government, a yo man of about 35, received an offer of $18,000 to go to Berlin

a year and introduce American shop methods in a large manufacturing establishment. At the end of the year he was offered $10,000 to remain another six months.

This means that the industrial supremacy of the United States is acknowledged and feared and that they will leave no effort untried to keep even with our pace. But these expedients while they may have some value will not effect the result which they hope for. How are they going to introduce into the German industrial establishments or French factories the Yankee wit and the cunning which animates the spirit of our factories from errand boy to manager. It is not so much the administrative detail which the superintendents of our factories have put in motion, which gives us our supremacy, but it is the superior average grade of intelligence which is found in all our trades and permeates and runs through all the ramifications of business; that superior average of intelligence, which is due to the free public school system of this country and those other educational agencies which supplement it, the libraries, the museums, the lecture courses, the extension courses, etc. For that reason the educational exhibit at the St Louis exposition will be of unusual interest to European scientists and statesmen to whom this question is now a burning one; and we believe the time is ripe for such a systematic and scientific exhibit.

It is a mistake to suppose that we do not have in this country a national system of education; that because we are a community of states our systems of education are divergent and opposed to each other. That is not so. So great has been the unifying and harmonizing power of the United States bureau of education under its great chief, Dr William T. Harris, and such has been the constant interchange of thought and method promoted by the National educational association that there exists today between the schools of Boston and St Louis and San Francisco less difference perhaps than may exist between the schools in the north and south parts of those same cities. In other words, in every progressive community the administration of details is much the same. Individual initiative and local

conditions are the only things which serve to distinguish (schools. The educational exhibit at Paris if it did nothing e served to demonstrate this, and I think it was almost as mı of a surprise to our own people to realize it as it was to forei ers to find it so. An echo of this has also come to our no in the press of the last three weeks in which it was said t the leaders of German educational thought have memoriali the kaiser and the reichstag to establish in Germany a cen educational bureau at Berlin which should have the same eff on German education that the United States bureau of e cation has upon our several states.

It therefore becomes the duty of the department of educat for the St Louis exposition to see to it that nothing of time money is lost or goes unspent to prepare a systematic and tl ough exhibit which shall exploit every phase of educatio effort in this country. For the first time in the history of country education has that conceded value to the industrial commercial development of the country to which it is entit For the first time in the history of educational exposition the world education is to have an adequate building devote its interests, and for the first time in the history of educatio expositions in this country it has been given the place of ho in the classification. For these reasons we believe that we h a right to call on and confidently expect to receive the supp of school men and of school interests in the United State particularly in the Empire state, whose great regard for schools has always led in legislative enactments—so that me ures in the interest of public education may be given the ri of line.

SOME DUTIES AND RESPONSIBILITIES OF A HI SCHOOL PRINCIPAL

Pres. Rush Rhees—I must confess to considerable diffide in coming before a body such as this and speaking on the to named, for the adequate reason that I never have had to b the responsibilities, nor have I had personal acquaintance w

the duties, of a high school principal. If there is any pertinency whatever in my making remarks on the subject it is because I have some personal acquaintance with the tendencies or habits of mind of the teacher and know some of his foibles.

I think all of us are congratulating ourselves because the work of teaching has been reduced in these last 100 years more or less to the basis of a science. We can not claim to have made very distinct advances on the great teachers of the ages in so far as the art of teaching is concerned. The rank and file of our teachers are doubtless more skilful than those of old, but we have none who rise above the standard set for instance by Socrates or by Aristotle. The art of teaching depends very largely on personality, yet it may be enlightened and greatly aided by the science of pedagogy, and there is our advantage over those that have gone before us. Our science has come to the place where it can claim recognition with other sciences, inasmuch as men of clear minds and great industry have studied carefully the principles which underlie skilful teaching and also the characteristics of that mental object on which we expend our endeavors. I think we need to recognize, however, as we talk glibly of our science, that the men of old would be much mystified if they were to gather in our conventions and hear us talk of self-activity, reactions, correlation, apperception and the like. These terms, which have come with the science, are technical to the science and will serve as an introduction to what I have to say concerning the use of technical terms.

Now you will not understand me to undervalue in any wise the use of technical language. In so far as it is intelligently used it means that we have attained a clear conception of some phase of our work—so clear that we can label it with a technical term. The man who intelligently uses such a term as "apperception", for instance, finds his mind working more clearly and distinctly than ever before and has a guidance for further work that he had not before. There is however a double danger connected with the use of technical language. There is a danger lurking in our own path as teachers. It is that danger of isola-

tion from common life which is connected with devotion to a science. This may be so common as to excite a smile, as wh we refer to the difficulty which the common mind finds with t terms used in debates on theologic matters. We do n understand their lingo when men enter into grave discussio concerning the technicalities of theology. And as a matter fact, we usually discount the value of a thing which we do n understand and are likely to consider that the man w debates with words which have no meaning to us is spendi his energies in debating about things which have no meanii Most of us when we get into the atmosphere of higher matl matics are absolutely helpless. The language means nothi at all, the diagram means less and the whole matter belongs another world of thought. So also the majority of us, specia those who were educated 10 or 15 years ago, find it somewh difficult when we take up so practical a science as electricity.

Now in so far as a man gives himself to the use of such tern to that extent he invites for himself an isolation from practic life. The isolation may perhaps be illustrated by a story to of Prof. Sylvester of Johns Hopkins. He was so absorbed his own particular work that when on going out one morning a coming to the brink of a ditch that the city department of pub works had dug in the street, he calmly turned round and we back home and did not go to the university that day. It nev entered his mind that he might go around by another bloc Observe the isolation in which he was dwelling; completely home in his specialty, yet utterly at sea when confronted simple problems of common daily life. We can all add to tl example from our own experience.

The worst evil of this isolation is that it robs us of the mo valuable check we have on the value of our ideas and methoc The man who lives in a world apart is more likely than a other man to go into devious ways that lead nowhither. T teacher who is constantly thinking in terms of appercepti and self-activity and other technical terms may forget th these terms have value only in so far as they apply to distir

thoughts in his intellectual life, and may go off into a magnificent dream about his pedagogic theories and so lose their practical value. I remember very well listening not long ago to an address by a teacher, in which constant reference was made to the self-activity of children. The word was used in such a way as to suggest to me that it was a sort of intellectual counter in his mind; that the man was using this term because he had been accustomed to it and not because it was the only word which could be used under the circumstances.

The value of a definite idea no one will underestimate. Our danger is in neglecting to bring our words down to the test of fact and actuality in every stage of our proceedings. Prof. James in his book *Talks to teachers* in another connection tells the story of a visitor who went into the class on geography and was asked by the teacher to question the pupils. The question was, "If you were to dig a well 200 feet deep, how would you find it at the bottom, hotter or colder?" The class could not answer. The teacher said, "The children do not understand the question," and taking the book asked, "What is the condition of the interior of the earth?" to which the reply was readily given, "It is in a condition of igneous fluidity." The child is very apt to pick the word with which he is unfamiliar rather than to take one easily comprehended. You remember very well how some new word charmed you, how like some strange thing it fascinated you, and the very fact that you could rattle it off was evidence in your mind that you had some sort of superior education. That is a tendency which we must recognize and the teacher who does not constantly and all the time brings his technical terms down to the homely fact, cultivates in the children an aloof and isolated attitude of mind. I think that is why a good deal of what we call education misses its point. You will say that it is because the teacher has not been attentive enough to the apperception of the new ideas on the part of the pupils. If the teacher would pay less attention to the word "apperception" and more attention to the thing, the child would have the advantage.

The other danger is the attitude of teachers toward pare and the community at large. I have in my own recollect the case of a city nowhere near this, in which a positive and v detrimental reaction rose against an admirable system of p lic schools. The actual reason of that reaction was that schools had been conducted on the principle of too great al ness from the people that were supporting them. For insta the pupils were given modern color work. They went ho and talked to their parents about perfected harmony and inc plete harmony and contrasted harmony. Now these terms i cate something very valuable and yet the parents could not any significance in them and when they went to the school t were practically told that they belonged to a past generat and must let this thing go on. The value of the schools actually undermined because the teachers and the superinte ent were so devoted to their isolated and aloof courses that t could not recognize the necessity of keeping in touch with translating these terms for their constituents.

I think one of the most beautiful illustrations of fine dist tion of philosophic thought that I ever listened to was a ture by Prof. John Fiske and the peculiarity of that lect was that there was hardly a technical term in it. It was a r discussion of theologic thought without a theologic te because the man knew his subject so perfectly that he was a immediately by perfectly clear apperception to translate it i other terms. I am a great advocate of the old-fashioned met of translation in schools from the Greek and Latin, beca I do not know of any intellectual operation more valuable the boy or girl than that of taking a given idea in one langu and putting it into another language. It is of similar value us as teachers to see to it that we put our technical langu into common speech—to make a habit of putting that techn language into common speech. I do not believe the child e suffers by having the idea come to it in a familiar langua Cultivate definiteness and distinctness of thought, underst what technical terms mean; and then talk in English.

Prin. Walter S. Knowlson—No one who has been at the head of a high school for several years needs to be told that the duties and responsibilities of a principal are many and various, suited often to local conditions and surroundings. His own experience from day to day in the routine of the schoolroom with its difficult and sometimes perplexing problems will bear testimony. Yet no principal would feel that his position as such had any value or importance without these duties and responsibilities which characterize his work. They bring to it the exercise of his inalienable rights, should he prove worthy of them, not through noisy self-assertion and querulous comment, but through demonstration of his capability to use them; they bring to it also vast opportunities—opportunities for him to do the most good to the largest number, proving his usefulness to all under his care and guidance in that profession he has chosen as his own.

The free exercise therefore of all his rights as a principal, when he has proven worthy of them, and the opportunities naturally growing out of them, can but influence and broaden the scope of his duties and his responsibilities in the discharge of them; his duties as a man, as a scholar, as a teacher to himself, to his associate teachers and to the pupils under his direction and authority. These must be, if he is the man he ought to be, the reflex of his thoughts, words and actions in the educational affairs of the school.

His duties to himself must in large measure affect him in relation to his teachers and his school and should therefore be considered first. Of these duties his care for his physical health and mental activity demand his attention and thought, for they with the relations established in his social life in the home, the school and the community are of vital import in determining his happiness and contentment; his satisfaction with and pleasure in the position now filled by him. It is the happy and contented workman who sings at his work and shows therewith the greatest efficiency.

Besides his general health and happiness, he owes to hi the duty of self-cultivation, not merely along the lines o: eral literature, history and science, the accepted thought (past and present, but specially by coming in contact wit best minds on educational matters the world furnishes, wh through books and periodicals, observation and practice o cational meetings and the personality of those in allied for work. Through these means, he not only keeps abreast a touch with what is going on in the educational world, but cease to live within the narrow sphere of his own self-sat personality. How many bright men and women there ar(are content to rust out! He learns the best and gives the to his teachers and his school and realizes what his true tion is, thereby gaining a professional spirit of courtesy, ch and brotherhood and thus aiding in building up and mainta the dignity of his chosen vocation.

A principal's duties to his associate teachers take on a fold nature: the actual teaching of the classroom, and the ters of discipline arising from the relations of the se teachers with the pupils under their control. In regard t first of these, a principal must fully understand the li work, its plan and method of presentation so that he may ligently and satisfactorily visit each class at least once a m thereby keeping in touch with its progress.

Directly after such visitation he should make notes of h servations, and at the earliest convenience meet with the te to discuss the recitation in detail and to show, if nee wherein to improve and better suit it to the needs of the (to heartily commend as well as to suggest and criticize. C such discussion must come light showing in what respec possibly why this or that pupil is deficient, whereby b must accrue to all concerned. Every principal must reco in this part of his work, that his associates both by prepar and experience ought to know their subjects, their pupil the best method of suiting each to the other with pleasur

profit. Otherwise, the sooner he recommends a change, the more completely has he fulfilled his duty and shouldered his responsibility.

In all matters of discipline, a principal has a very plain duty and often an unpleasant responsibility which must be faced with courage and promptness. He must strengthen and maintain in all proper ways and by all proper means the power and authority of the teacher at all times and in all places, considering the teacher first and foremost, the pupil second and secondary. He should provide—yes, insist—that all matters of petty discipline be settled justly and amicably by the teacher alone and not carried to him in every instance. In this way the principal is freed from much annoyance and loss of time; the teacher is strengthened and more ready to meet the next emergency. This can be done by the teacher and pupil both knowing what action the principal would be sure to take from his speedy and positive position on similar previous questions of discipline. Of course the principal must have effectually established himself with both the teachers and pupils.

On matters of appeal he must be decisive and just, keeping in view the good of the pupil and the authority of the teacher and thereby the maintenance of the discipline of the school. A principal, in his readiness to criticize the pupil, would be most neglectful of duty, if through policy or cowardice he failed to point out to the teacher, in a kindly manner, apart from others, her failings and mistakes should she be at error. At such a time he should show only a spirit of charity and loyalty and cause her to feel that he is her associate and colaborer, as well as principal.

A principal's duties to himself and the members of his faculty are but a part of the greater duties and responsibilities in relation to the school under his direction and guidance, yet they are a very essential part. Any one who fails or neglects to give careful and painstaking attention to the aforesaid duties will find that he is heavily handicapped at the start. How can he make up for this deficiency? Will his personality be strong

enough to meet the demands made? In a measure yes, but t is largely dependent on the man and his capabilities. If he wise he will yet learn the existing need and in his wisdom v endeavor to meet it.

His duties and responsibilities to the school as an organi of which the pupil is a part, are manifold and exacti Through his personal influence both directly and indirec exerted and felt, is set and maintained its industrial, intelle ual and moral standard. Here is his workshop, in which he the manager, his teachers the foremen, his pupils the workm Profit-sharing is the stimulus to the greatest efforts to att the largest efficiency. Yet some need direction, others gu ance; some encouragement, others restraint; some compulsi others removal. All are laboring to secure perfection in tl training which shall make them skilled artisans. In this w the principal should not be merely the administrative pow but should also instruct as much as possible without detract from his ability as the controlling force. As a teacher in classroom his knowledge and experience ought to play th part by coming in direct and constant contact with the gra ating class and as many others as time and opportunity pern He thus leaves his impress on the instruction as well as general management and discipline.

In this last essential so necessary to the welfare and pr perity of the school and the well-being and reputation of principal, he is the larger factor, the molding influence. I sympathy and cooperation with his pupils in their work a their recreation, their difficulties and their successes, th pleasures and their disappointments, are here given their full opportunity to create and perpetuate a hearty good will an cheerful willingness on the part of all to do their best in broadening, deepening and strengthening of that character b of self-control and self-culture. The wisdom and prudence the principal, the trust and confidence of the pupil, shou secure the results which must produce for the one satisfact

and gratification; for the other, present good and future advancement in that vocation which he has made his own.

Prin. A. S. Downing—One of the old guard came to me yesterday afternoon in the Yates hotel and said, "Now, Downing. I know 999 duties and responsibilities resting on high school principals and I don't want you to tell me any more." I said, "I have been looking for a conspicuous example of one type of high school principal; thou art the man."

A number of years ago at an institute in Herkimer a young man teaching in a small school said to me that he had certain ambitions; that he wanted to be an inspector under the regents, that he wanted to be an institute conductor, or he wanted to go to some high school that would give him a broader field for the exercise of his genius. I liked that fellow—I like him yet—and I said to him: "My friend, stay where you are. Stay there till you know the business of a high school principal better than any other man of your age. Learn the business from bottom to top. Know what the requirements are for every college in the east. Know what the requirements are for a regents diploma in every department in which they grant diplomas. Study school management. Study men. Get an insight into high school work; and make no mistake about it, when the time comes you will be called." The young man did not like it very well but he followed my advice to a certain extent and has been called several times since to higher places.

If there is any duty or responsibility resting on high school principals—I am not talking to the men who know 999 of them, to the principals who know quite as well the value of what I say—I am talking to the young men of this gathering—if there is any duty which rests on you today in becoming high school principals it is the duty of acquiring an insight into high school work. That is what men and women lack in our business; they lack insight. A position is offered say at $1500 a year and I am getting $900 where I am. I have a college education, I need the money and I want the place. My friends, is it not true that in our business as in every other business we are under

obligations to the community to give value received for t salary paid? And as for this $1500 place, unless I have insig into the business to the amount of $1500 and more—becau the community is entitled to some profit above the bare salary unless I have an insight into high school work greater th the value of $1500, I am a presumptuous youth to offer ı name for the place. It runs all through the work of the hi school from the $600 place to the $5000 place. What we ne is insight into the business.

Mr Carnegie said at a dinner one evening where there we eight or 10 men present: "We never take a man and place h in a responsible position from behind the desk, we always ta a man who has come up through the shops, a man who has insight into our business; and I might surprise you gentlem by saying that we have more than 50 men in our employ whom we pay more than $25,000 a year, and every one of the has come up from the lowest room of the shop. These are t men who have an insight into the business. These are t men that can give us points on our own work and we are rea to pay them $25,000 a year." Insight, my friends, is a du and a responsibility which rests on you and rests on me.

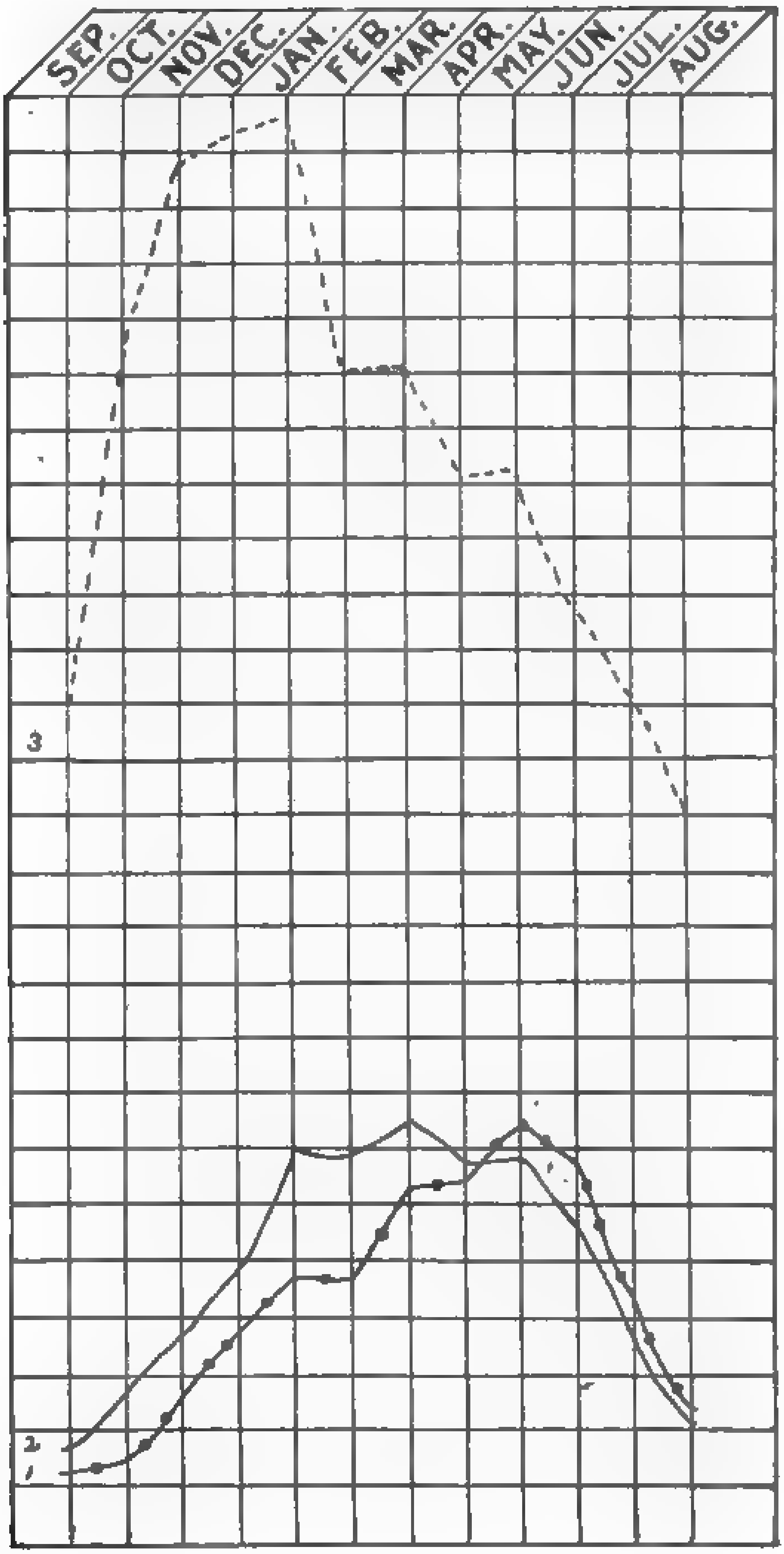
The next point, I would say, is imagination, and there is whe we all fall down, the older as well as the younger man. It said of Mr Rockefeller that when a young man in the Standa oil co. he did not agree with the management, and finally a m with a greater holding said, "Well, Mr Rockefeller, what w you give or take?" Mr Rockefeller said "What will you gi or take?" and the man named to him an almost fabulous su of money. Mr Rockefeller said, "Will you hold that open t 2 o'clock this afternoon?" and went out and stated the ca to the banks and borrowed the money that gave him a co trolling interest in the Standard oil co. All over Pennsylvan and Ohio at that time were oil wells and a lot of poor m were manufacturing oil at 80c a barrel. Mr Rockefeller sa to himself, if there should be a pipe line running through hei a great pipe line running to the seaboard, and pipe lines co

nected with that great pipe, and other lines running from the wells into tanks, and I could measure it up and give the market price for it, what a great revolution would come in this matter of oil. There was imagination for you. He had the imagination to see before him an ideal plan, and he began to lay the pipe lines all through the Pennsylvania oil fields, all through the Ohio oil fields, and a man who at that time was a pauper is independently rich today simply because Mr Rockefeller put a pipe line through that country and all he had to do was to lead the oil into the tank. When the tank was full he got his money for it at the market price and he became a producer in the larger sense of the term. Imagination, my friends, is what we need. The principal or superintendent sees the work that this teacher or that teacher is doing and adds just one more touch to make it ideal. Everything that he does contributes to the perfect image.

But there is another thing that we need to have in our high school work, namely, heart. Do you know that under the pressure from the institutions above we are today working our high school boys and our high school girls and our high school teachers practically to death?

Chart 1

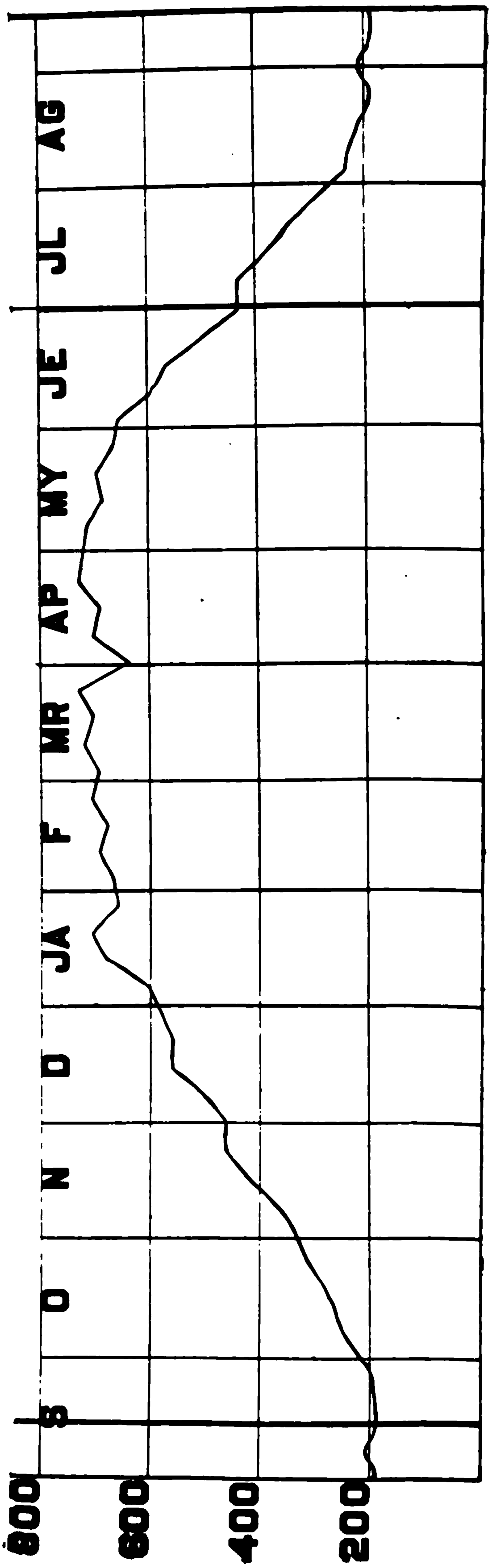
Chart of average monthly mortality in the state of New York due t 1) measles, 2) scarlet fever, 3) diphtheria and croup.



Average was taken for 10 years from the annual reports of the state board of health. Eac vertical space represents 20 deaths.

Chart 3

Chart of average number of cases of measles, scarlet fever and diphtheria as reported weekly in the boroughs of Manhattan and the Bronx for six years, 1894-99.



SCHOOL SURROUNDINGS: HYGIENIC, ESTHETIC

E. W. Lyttle—The topic is a large one and I shall be obliged to leave to others the latter part of it with this word. Of all the places in the world, the school can not be too beautiful, too cheerful, too replete with all that inspires noble feelings and noble thoughts. And it is not unlikely that when we have somehow freed ourselves from the barbaric vanity of the dollar, our men of wealth will build fewer palaces for household servants but will see to it that our public buildings are things of beauty, joys forever.

Physicians often claim that their labors multiply as the school year progresses. We ourselves know that a certain per cent of our pupils become anemic, nervous and hollow-eyed by November and so continue till the summer months bring abundance of sunshine and outdoor sports. Now inclement weather, unsanitary homes, the generally great increase of acute respiratory diseases in the late fall and early winter, mental strain due to long lessons and nagging teachers, explain some of the trouble. Will they account for all of it? Mental activity of the proper kind and amount is just as natural for children as physical activity and if we may judge by results, children below the 8th grade are not generally overworked.

A few words in regard to the charts are necessary. Chart 1 was compiled from mortality tables published by our state board of health and shows for 10 years the average monthly mortality due to measles, scarlet fever and diphtheria, these three being the infectious diseases which for the most part affect children and also the ones that cause deaths among children of school age. Whooping cough though very fatal to infants is seldom dangerous to children over 5.

It will be noticed that measles and scarlet fever are lowest in September, follow nearly parallel lines, reach their maxima late in the school year, continue high till warm weather brings open windows and doors, and thereafter decline rapidly. The bulletins of our state board classify croup and diphtheria as one

tigation is new. And he who dogmatizes may be damned. We do say that these charts should make us ask serious questions.

What are the possible factors of infection that exist in our schools? There are four, common drinking cups, bad plumbing, dust, poor ventilation. So far as my personal experience as an inspector goes I do not think that bad plumbing is responsible for much illness among school children. If the plumbing is properly trapped, the sanitaries disinfected, the soil pipes tight and the basement floors cemented, there can be little danger from the plumbing. Plumbing is easily examined and even in small villages there is usually found some one who is a competent judge of these matters.

Dust is a more serious menace. An examination of the dust taken from the floor of a schoolhouse in Germany revealed germs of 20 different diseases. Even germless dust is a peril, for statistics show that dust-producing occupations double the average death rate.

The time has certainly gone by when boards of education can afford to hire as janitors men incompetent to make a living in any other way. It is not too much to require that the floors of school buildings be tight, that they be mopped at least once a week with a disinfecting solution, that dust be not allowed to collect on walls or over doors, windows and cases.

It has been my lifelong conviction, strengthened by every year of experience, that bad ventilation is responsible for very much ill health among school children. The problem of providing fresh air for a crowded room without producing dangerous drafts is the most difficult one that confronts the architect and the sanitary engineer today and so far it seems to be the problem that has attracted the least brains and the most knavery for its solution. In planning a public building the question of ventilation should receive first consideration. Nearly always the schoolhouse is built and the ventilation comes as an afterthought if it comes at all. About 80% of the high schools which I visit have no system of ventilation whatever. A 6 inch hole let into a rough 8 inch brick flue to exhaust the vitiated air from 50 pupils can not be called a system of ventilation. The air would

ning of inlets and outlets. Among the school buildings of the state that seem to be perfectly ventilated I may mention the new Utica academy and the Washington Irving high school at Tarrytown.

For schoolhouses of less than eight rooms the cost of fan ventilation seems prohibitory. Here some gravity system must be used. An abundance of fresh air gently warmed by furnaces or steam coils is introduced through registers, and the foul air is drawn from the floor into a warmed ventilating flue. With this system even more than with the fan system great care is necessary in properly placing the inlets and outlets. It would seem necessary theoretically that there be several inlets and one outlet or one inlet and several outlets; but I have seen systems that gave fair results where the air was introduced in large volume about eight feet from the floor over the teacher's platform and drawn out beneath the platform. All gravity systems though are affected more or less by wind and weather and fail of uniform results.

One thing is absolutely necessary for the successful installation of any system. A competent firm with capital behind it must be employed and this firm must be made to guaranty by bond that it will do what the specifications call for, and the specifications should not be less rigid than those demanded by the district police of Massachusetts.

In small schoolhouses heated by stoves, the stoves may be jacketed and fresh air introduced by cold air boxes placed underneath. If no ventilation be possible, the German method of throwing open the windows five minutes between recitations and giving vigorous calisthenics may be followed.

What can we do to secure good ventilation in our state?

Superintendents should keep health statistics of each school building. So far as I know this has never been done. We need a state law moderate but exact in its demands. Under the superintendent of public instruction there should be the best sanitary engineer the state can hire and for his approval should be submitted all plans and specifications for new school build-

ings and for the remodeling of old ones. Every school inspector should be furnished with anemometer and tape line and be required to report the sanitary condition of each school inspected. An enforcible law is a good educator. Massachusetts has had a fairly good law since 1888. Mr Frank A. Hill, secretary of the state board of education, says in regard to the Massachusetts law: "New buildings almost universally comply with ventilation requirements of the district police. In case of old buildings compliance is gradual. The law works well." Comparing the mortality in Massachusetts due to measles, scarlet fever and diphtheria from 1880-89 with the mortality from the same diseases from 1889-97, we find there has been a decrease of 30%. Here again I am not ready to say whether this decrease is mere coincidence or an effect of better ventilation; but there seems to have been no decrease of mortality from these diseases in New York.

After all no law is worth much unless it is backed by public opinion. That public opinion we must make. Editors will help us if we seek their aid. Every child properly taught will become a fresh air missionary. Every honorable physician will be an ally.

Below is copy of a blank used by the district police in enforcing the laws of Massachusetts relative to ventilation of factories and public buildings.

SIR: In the ventilation of school buildings the many hundred examinations made by the inspectors of this department have shown that the following requirements can be easily compiled with:

1 That the apparatus will, with proper management, heat all the rooms, including the corridors, to 70°F in any weather.

2 That, with the rooms at 70° and a difference of not less than 40° between the temperature of the outside air and that of the air entering the room at the warm-air inlet, the apparatus will supply at least 30 cubic feet of air per minute for each scholar accommodated in the rooms.

3 That such supply of air will so circulate in the rooms that no uncomfortable draft will be felt, and that the difference in

temperature between any two points on the breathing plane in the occupied portion of a room will not exceed 3°.

4 That vitiated air in amount equal to the supply from the inlets will be removed through the ventiducts.

5 That the sanitary appliances will be so ventilated that no odors therefrom will be perceived in any portion of the building.

To secure the approval of this department of plans showing methods or systems of heating and ventilation, the above requirements must be guaranteed in the specifications accompanying the plans.

Sup't A. W. Abrams—True education enables the individual to realize the highest aims of actual life. A completely educated person lives in touch with all the forces around him. He displays practical sagacity in the affairs of daily life, but he is not a stranger to those emotions that belong to a higher, spiritual nature. Is there an education that not only enlarges the intellect, but also broadens the sympathies, and enriches character? Then we want more of it in every walk of life, and the school should be a factor in its production.

Through all the past, men have been searching for three things: the good, the true and the beautiful. Look the world over and you find its great names and great events associated with these ideals. These have been the impelling and abiding forces in human society. The Spartan gave himself up to war and physicial endurance, but the ideal of the Athenian was grace and beauty in physical form, in speech and in plastic art. While around the Acropolis grew a spirit of the artistic that still influences the world, the Doric city is but a name.

The school has an important work to do in developing appreciation of the esthetic; and the present disposition to beautify the surroundings of the school is one that must have marked culture value. That a decided change is taking place in the attitude of communities toward the subject of art instruction is evidenced by the genesis of school work in drawing. But a few years ago, in most schools it was not an easy thing to introduce even elementary work of this sort. Boards of education hesitated to use public funds for this purpose and parents pre-

ferred to have their children study subjects they considered more useful. Today, not only has the character of the work in drawing changed greatly, tending much more toward an emphasis of the artistic, but we commonly hear people speak of the art teacher and of the art department of the school. It may be fairly assumed that the esthetic is coming to have a recognized and secure place in the public school.

But we can not teach the child to love and appreciate the beautiful unless he is brought into contact with it. Culture comes largely from environment. It is of the greatest importance, therefore, that the school surroundings be attractive and present correct ideals of taste. Thus unconsciously day by day the child forms a standard of esthetic judgment that abides with him through life.

What shall enter into schoolroom decorations is a large question, and one that each school must answer for itself. In erecting a new building excellent results can be easily secured and usually at very little additional expense. With an old building, constructed without reference to appearance, the problem is more difficult. Yet if there are those who know what is best in art and who have a good sense of space and color relations. to work out some ideal, how completely may even such a building be transformed! Where only a little can be done at a time, it is still important that there be a clear conception of what is finally to be attained and that each step taken shall contribute toward the realization of this idea. Often a beginning is to be made by discarding that which is inartistic and by making a better arrangement of what remains.

Various means may be employed for securing the pictures. casts and vases needed to produce more attractive schoolrooms; but the exhibitions of pictures that have been so extensively given throughout this state and elsewhere have the two advantages of not interrupting in the least the regular work of the school and of interesting the whole community in schoolroom decoration.

But decorations may be of such a character as to defeat the end in view. They must not become obtrusive and draw too much attention to themselves. The schoolroom should not be a fairy garden. Too often every available space is filled. There are pictures of all kinds, some framed, but more unframed. These are tacked on the wall, strung in rows above the blackboard and suspended on wires stretched between the windows. Evergreens, dried grasses, flowers, flags and curios are in corners, on shelves and tables, and even in windows where they shut out much needed light. And all this is called beautiful! But such are not the conditions most likely to secure good order and quiet, thoughtful work, to say nothing of securing an appreciation of art.

On the other hand, the effect of order, harmony, and repose in the furnishings of the school is seen at once in discipline. The poise of students improves, the step lightens and all disposition to scuffle disappears. In short, the child, like the man, promptly manifests a tendency to put himself in harmony with his environment. If you are having disturbances in the hall, place a piece of statuary there, and the boys will soften their manners.

It is pleasant to be able to show visitors fine rooms but our first concern in respect to art should be to create in the child a higher appreciation of the beautiful than he already possesses. The decoration of the school must be made subordinate to the purpose of cultivating in the child a sense of beauty and appropriateness. It should never become an end in itself.

In carrying out this purpose, even look beyond the schoolroom to the schoolyard. Ample grounds for play are important but they should not extend to the front doorstep. A greensward and some shrubbery soften the harsher lines of the building. The effect of the whole should be that of a picture with liberal foreground and with proper grouping of details. The school grounds are public property and specially subject to public gaze. As such, their condition should disclose careful attention and an exercise of good taste.

A cultivation of the sense of the beautiful is not inconsistent with the pursuit of the practical activities of life. Art has persisted throughout the centuries, a dominant factor in man's development. It is an important function of the school to give pupils, through more esthetic surroundings, the ability to recognize and to love the beautiful. Incidentally, the discipline of the school is made vastly easier and more wholesome by the development in the pupil of an appreciation of the fitness of things as presented to him in his environment.

Prin. J. R. Fairgrieve—The hygienic and esthetic features connected with school surroundings should receive careful consideration at the hands of all who have in charge the educational interests of their community. They are features which should and do receive consideration from those who have the supervision of educational matters in the state and nation.

As a proof that prominence is given to these important features, we find today adorning the villages as well as the cities of our state many school buildings constructed with due regard to sanitary principles; planned with proper consideration for heating, lighting and ventilating; beautified by appropriate architectural designs and well kept lawns; corridors and rooms decorated with pictures and plants; desks and walls free from mutilation and marks. When these conditions are compared with those of a quarter of a century ago the contrast is marked. What was the exception has become the rule, and how much it is to the advantage of educational progress can easily be seen.

Yet hygienic and esthetic improvements in school surroundings have not received as general consideration as many other features of educational work and any new suggestions which are practical, which can be successfully utilized along these two lines are worthy of careful consideration. There is not so great a lack of expert authority on school hygiene or of desire on the part of the community to have the proper conditions filled. A great lack, however, is often found in the teacher's failure to give thought and attention to little matters which are in reality

the foundation stones on which the superstructure of the hygienic and esthetic environment of a school is built.

The hygienic branch is the one I have been asked to consider; the more hackneyed but the more important of the two, as it is the province of hygiene to determine how to keep the wonderfully constructed human body in good working order. Certainly two great aims of education are to bring as near perfection as possible the human being, physically and mentally. When we consider that the mental training depends so much on the physical condition, the importance of having school surroundings such that they will always tend to the healthy development of the body is clearly evident. Teachers are not always consulted in regard to location, plan and construction of school buildings though if they have clear ideas on the subject their suggestions will have weight. They always, however, have the opportunity and the privilege of instilling into the minds of pupils the importance of keeping their bodies in a healthy condition and of utilizing to the best advantage the existing conditions of the school and its surroundings. It is along these lines that the teacher's efforts may reasonably be expected to accomplish the greatest results.

It is stated on good authority that of students who enter college 10 break down for want of physical stamina where one fails for want of mental ability. If this be true, there is certainly need, in elementary and secondary schools, of more careful instruction in the physical preparation. A few illustrations are suggestive of others which have hygienic importance. The superintendent, principal, or science teacher should, at least once a term, visit each room in the school and give a well prepared talk on physiology and hygiene suitable to the grade. A manikin should be used to illustrate the points considered. This will make a decided impression on many pupils, coming from the specialist on the subject or the head of the school. In addition it will be an incentive to the grade teacher to do more than in a perfunctory way teach the subject to meet the requirements of the law. An opportunity is also given of dispelling

some of the false impressions in the mind of the child often obtained by the use of charts illustrating the morbid condition of the stomach and other organs.

Slates should be discarded from all grades of the school for pedagogic as well as sanitary reasons. They are noisy and encourage carelessness as pupils are constantly erasing letters and figures. It is a difficult matter to keep them clean and they are dangerous to the school because of their liability to spread contagious diseases.

The temperature of the room, which is generally under the control of the teacher, is often improperly regulated. Some teachers and pupils seem to require a higher and some a lower temperature for the best results. A standard is required. 70° brings discomfort to none and it should be kept as near that point as possible.

Ventilation is universally conceded to be one of the most important features in school hygiene. Where the school is provided with a good system of ventilation it should receive the careful supervision of the principal. The janitor's whole thought in winter seems to be centered on whether the building is warm enough. The important matter of ventilation generally receives little or no consideration at his hands. Where no provision has been made for proper ventilation, the teacher should use every device to keep the air as pure as conditions will permit.

Recess is a time for relaxation. It generally is and always should be given in the first eight grades of school. In high schools, where there are two sessions, it can safely be dispensed with but a time of rest and freedom from study of three or four minutes duration at the close of each recitation period is highly desirable.

Recitations in the first eight years of school work should be so regulated that it is not necessary for the pupil to study outside of school hours. Hygienic laws demand that the growing child have an abundance of time for sleep, recreation and the enjoyment of pleasurable pursuits other than school work.

The ideal lighting of schoolrooms can rarely be secured. The demand for all available space precludes this. Every consideration should, however, be given to this feature, as the eye is too precious an organ to be trifled with. The large number among the young who wear glasses leads us to the belief that modern education with its existing conditions tends to nearsightedness or defective eyesight.

The above are a few simple but not always carefully considered features and while the teacher may be unable to materially change the existing conditions of the school building and its surroundings, he can do much to add to its efficiency from an esthetic as well as a hygienic standpoint. More specially, being brought into direct contact with the pupil, he can inculcate principles of hygienic laws essential to physical development which will have their influence not only in the school but in the community.

Prin. J. S. Wright—The topic of hygienic and esthetic surroundings in the school resolves itself into two questions: what are these surroundings, and what should they be?

In the first place, as to hygienic surroundings in the school, generally speaking there are none. There are exceptions to this rule; but the average school, specially in the village, is almost entirely without hygienic surroundings. If there are not some improved conditions to prevent the danger now lurking in the present methods used for drinking purposes in the ordinary school, it will not only do away with but destroy all efforts however well intended in other directions. It is without doubt a safe statement that 90% of all school children in New York are compelled to quench their thirst from a common drinking vessel, which is one of the most dangerous conditions of our modern school buildings. The danger of transmitting disease can never be eliminated till at least as much pains and care are taken in the public school as the ordinary breeder takes of his herd of fancy cows or stable of thoroughbred horses. If the drinking question in our schools is a question of hygienic surroundings, it is a negative quantity.

"soil" of education; but pure, bright, happy, robust and active minds can no more be produced without proper hygienic and esthetic surroundings than vigorous vegetation can be produced without atmosphere, heat and light. The atmosphere produced in the school by common sense hygienic surroundings, mural decorations, well kept buildings and grounds, will do more for the proper development of a bright, happy, useful citizen than all the study of pedagogy, psychology or science and history of education on the part of a teacher can ever produce. Air essentially free from bacteria, water free from contagious disease, beauties of nature, are God-given rights, and no child should be deprived of them by the environment of school life. Without life-sustaining atmosphere mental activity and all life and development are impossible. Life and death are in the atmosphere. It is not alone the elements of the atmosphere that bring life and death to all within its scope, but the temperature and movement decide the degree of life which may be attained or preserved within its influence. Without sufficient warmth in the air, its oxygen is of no avail. Though the oxygen and warmth are present, the moving air may carry death. No agriculturist depreciates the importance of proper atmosphere; no physician undervalues the importance of the atmosphere which surrounds his patient. And what is true in the physical world is doubly true in the mental and moral life. Death as well as life is in the atmosphere.

The most important question in connection with every school should be—nay, is—is the atmosphere of this school suited to the best life, growth and development of healthy and beautiful nature? In most of our schools the answer to this question must necessarily be in the negative. In many cases about the only factor for producing this hygienic and esthetic atmosphere is found in the teacher alone. Proper conditions are not seen, but felt. It is only the effects that are visible; the cause is inferred. It is not enough for the teacher to have lofty ideals and instruct and train students toward those ideals, but the atmosphere must be such that it will foster and develop the

very characteristics of those ideals. Such an atmosphere is an absolute necessity for the best development of child life, and in no other way can this atmosphere be brought about than by remedying some of the hygienic conditions, by increasing decorations and beautifying surroundings. It should no longer be considered a desirable condition, but a necessity. And if the interest of school patrons is not sufficient to overcome the reluctance with which they spend their money on the education of the rising generation, it should be forced by legislative action. The giant oak and the graceful elm are too liable to represent so many cords of wood or feet of lumber. The waves of gold in the summer fields may awaken no thought except that of utility. The hillside brook rippling from its mossy bank may excite no thought; but it ought not to be so, and as long as this condition is true, the public school has not fulfilled its mission.

The public school has a work to do, and in doing this work it has no right to enforce conditions on children other than what may be obtained from nature. The school must have the bath; the sanitary drinking fountain must be universally used. All school walls must be tinted and adorned with reproductions of great pictures and casts of famous statuary, and windows must be filled with growing plants and aquariums. It is under these conditions only that the public schools will be enabled to meet the demands made on them by an unrelenting public mind.

Prin. O. W. Wood—In preparing this paper I have endeavored to treat the question largely from a fact point of view. A certain amount of theoretic reasoning is without doubt beneficial but in the question under consideration I have left this field open to my colleagues. The pen pictures of ideal conditions which they have drawn, or may draw, will without doubt be a stimulus to many in bettering the cause of sanitary affairs and in teaching a greater love for the beautiful. That the latter field is practically in an uncultivated state, all will admit; but great advancement is certain to be made in the next few years. More attention, however, has been paid to sanitary matters but even here we find a large opportunity for work.

In the allotted time for preparation, I have found it difficult to study the question more than locally, and even that only in part. On November 27 I sent the following circular to the principals of regents schools of Allegany and Cattaraugus counties.

> Will you fill in the following blanks as far as the matter pertains to your school and return to me at your earliest convenience? I desire to tabulate the results, showing the actual condition in Allegany and Cattaraugus counties, and incorporate the same in a paper on school surroundings to be presented at the Syracuse meeting. If you do not know the facts for 1895 please consult some former member of the school board.

The blank appended to the above called for information pertaining to the campus, to the building, to hygiene and to esthetics. Notwithstanding that all answers could be given by simply making a cross for the facts for 1901 and by drawing a line underneath those for 1895, and furthermore that a stamped envelop was inclosed to each principal, yet nine of the 28 failed to reply. A second letter brought seven more replies and a third 50% of the remainder, and without doubt before another meeting of the association the one principal left will find time to reply to my third and last call.

The tabulated replies are hereby submitted and become part of my paper.

School surroundings: esthetic and hygienic point of view

REPORT OF THE 28 REGENTS SCHOOLS OF ALLEGANY AND CATTARAUGUS COUNTIES

Campus

WALKS

	Board	Stone	Gravel	Cement	Total schools
1895	15	8	4	0	27
1901	11	8	4	4	27

LAWN

	Good	Grass cut occasionally	Yearly	
1895	6	10	10	26
1901	13	7	7	27

TREES

	Plenty	More being set out	Well trimmed
1895	16	0	15
1901	21	6	20

Buildings

MATERIAL

	Wood	Brick	Stone	
1895	13	13	1	27
1901	11	15	1	27

CONDITION

	Good repair including paint etc.	Repairs needed	
1895	21	6	27
1901	24	3	27

Hygiene

SWEEPING

	Daily	Semiweekly	Weekly	Semimonthly	
1895	1	13	8	3	25
1901	10	14	3	0	27

MOPPING

	Semimonthly	Monthly	Once a term	Yearly	
1895	0	2	11	9	22
1901	3	8	10	6	27

Esthetics

	Flowers	Pictures	Statuary	Organs	Pianos
1895	2	6	0	16	8
1901	10	21	2	15	18

19 schools report "no value" on pictures and statuary for 1895
8 schools report value of pictures and statuary for 1895 $165
10 schools report "no value" on pictures and statuary for 1901
17 schools report value of pictures and statuary for 1901 $1075

In looking over the report on the campus we find a gradual increase in substantial walks, board ones decreasing from 15 in 1895 to 11 in 1901. They have been replaced by stone or cement ones. There are plenty of trees on 20 campuses while on the remaining 7 more are being set out. We also find that

:he trees are well trimmed. The attention that the schools ıre giving to trees and shrubbery is undoubtedly due to the ıctive interest taken in Arbor day exercises by the department ›f public instruction under the wise direction of Sup't Charles R. Skinner.

The report on the care of the lawn is not so satisfactory. Of the 27 schools, only 6 report lawns for 1895, and during the past year 14 boards of education have paid practically no attention to the care of the lawn. One principal writes that "the grass is cut once a year for hay," and 6 others make similar report. Comment is unnecessary.

15 buildings are constructed of brick, 2 having replaced wooden ones during the past six years; 1 is of stone. With the exception of but 3, all are in a good state of repair including paint, etc.

Under hygienic conditions, the circular called for janitor service, including both sweeping and mopping. The figures 10 to 1 denote the increase in daily sweeping, while 8 to 3 show the relative number of janitors for the two periods who put off sweeping till Saturday. The practice of biweekly sweeping has been relegated to the region of filth and boards of education are now willing to expend a few dollars for good janitor service. The custom of hiring a couple of women to put in an appearance once a year with mops has given place to modern sanitary methods and 3 boards require the janitor to do the work once in two weeks.

In the development of the fine arts we find the most rapid growth. Today 10 principals report flowers as compared with 2 six years ago. For 1895, 6 report pictures, and for 1901 the number has increased to 21. One school has invested $250 in statuary, while a second has recently sent in its first order. Six years ago 9 of the 27 schools had neither pictures nor statuary, while for today that is true of only 8 schools. During the time the value of pictures and statuary has increased 700%. The willingness of the board of regents to duplicate certain amounts used for this purpose can not be too strongly com-

mended by this body. The 10 new pianos purchased during the period also indicates the feeling of the communities in musical pursuits.

Education in esthetic lines makes rapid progress when the individual is brought into the proper environment. Children by nature love the beautiful. Nearly everything in its perfect condition is beautiful. A perfect circle or a perfect square has its elements of beauty as well as the Corinthian column of the Greeks. When the child has seen the perfect figure or work of art, he is no longer satisfied with the imperfect. Hence one copy of a masterpiece on the wall or a plaster model of a classic figure on a pedestal creates a love of fine art.

This has been vividly illustrated in the Olean schools during the past six years. In 1896 the members of the high school congress collected $27 for pictures. The regents granted an equal sum and three Hegger photocarbons valued at $18 each were placed on the walls. The effect not only on the high school but on the ward schools, was marvelous. The children wanted pictures and they wanted good ones. Today there is not a grade room in the city schools without a picture on its walls; nor has a single dollar been appropriated by the board of education. Furthermore, the board does not allow public entertainments charging an admission fee to be given in the buildings. The children have raised the money: in the high school largely by interscholastic debates; in the grades, by the sale of old rubber goods, newspapers, etc. What is true of the work of the painter has been equally true of the work of the sculptor. The *Victory of Samothrace*, resting on the prow of a Roman vessel, purchased in 1899 for $35, has stimulated each room to take action to secure something, whether it be a life size model of Hebe, a frieze from the Parthenon, or a medallion with some classic figure in bas-relief.

And in closing I repeat again that esthetics in our schools need only a start. The emotions of the child will do the rest. His love for the perfect will overcome obstacles, and our homes, our villages, our cities and our schools will be made beautiful

by the hand of the painter, the chisel of the sculptor, or the spade of the landscape gardener.

Rev. J. H. Conroy—Environment in its broad sense signifies the external conditions and agencies that surround an individual. Its importance as a formative influence is generally recognized. "Circumstances make the man," and, "I am a part of all that I have met," are only other ways of asserting the power of environment for good or for evil over the human body and human soul. Life itself, according to Mr Spencer, is but a correspondence with it. It is the duty of the educator, whether in the home, in the church or in the school, so to shape surroundings that correspondence with them may broaden, elevate and refine life.

The pupil who enters a high school or academy is the product of heredity and previous environment. These factors may have been good, bad or indifferent. They may have worked in harmony or in direct opposition to each other. Heredity may have conferred a strong constitution which environment has debilitated; or perhaps a sluggish intellect, which environment has energized and quickened. We may not be able to determine which of the two forces is responsible for the defects or shortcomings manifest in a pupil; but whether his weakness be hereditary or acquired it is our duty to bring to bear on him the most efficient supplemental and corrective environment.

Hygienic environment. We are fast becoming, like the Germans, a spectacled people. The fact that many of our school children—and the number is constantly on the increase—are wearing glasses, is presumptive evidence of faulty hygienic conditions somewhere, most probably in the school. Some remedies are, better light, better blackboards, good type in textbooks and fewer demands on the optic nerve in the matter of much reading and much writing.

Since imposed tasks come under the denomination environment, permit me to say a word in the interest of overtaxed, nervous pupils. These are frequently and logically among the most assiduous and proficient. The fad of modern days to crowd many sub-

jects into every grade, while plausible in theory, is in practice disastrous, not alone to the healthful development of the body but equally so to that of the mind.

Remedies, less strain, less drudgery, less dread of examination, better quality and smaller quantity of work.

Demand of the high school, for instance, but two books of Caesar instead of four, three of Virgil instead of six, and the pupil will have better health and a better understanding of his subject. The teacher too will be physically stronger, more thorough and contented in his work and less exposed to criticism for not having done the impossible well.

At present no plummet is needed to measure the knowledge of an academy or high school graduate. The fault lies not with the teachers, for they compare favorably with the best; nor with their methods, for these are the most approved. The explanation is found in the fact that the colleges demand as a condition of entrance that candidates shall have read authors, instead of knowing them, shall have covered areas instead of touched depths. Might we not bring about the needed reform by encouraging our pupils to attend only such colleges as require much rather than many things? We should not cooperate with any Moloch that sacrifices health and real culture to the vanity of a pretentious curriculum.

It were well if each school could have its gymnasium, a clearinghouse where blood-vessel, nerve and muscle could square accounts each day with the brain and leave no unsettled balances for the morrow. But there would be less need of gymnasium and physical culture if the assignments of work were more judiciously adapted to the mental and physical strength of our pupils.

Esthetic environment. Esthetics may be briefly defined as the science of the beautiful. It is so called because the beautiful is more easily felt than understood. Beauty is the splendor of order. The discernment and appreciation of it belongs to the esthetic faculty. Notwithstanding all that has been said to the contrary, this appreciation of beauty is essentially rational. We do not look for esthetic taste among irrational animals. The

eagle, though its eye be telescopic, can not behold what we perceive in rainbow, flower or sunset. " 'Tis not," says Jeremy Taylor, "the eye that sees the beauty of heaven, nor the ear that hears the sweetness of music, but the soul that perceives all the relishes of sensual and intellectual perceptions. If the child beholds the rich ermine or the diamonds of a starry night, or the order of the world, or hears the discourses of an apostle; because he makes no reflex action on himself and sees not what he sees, he can have but the pleasure of a fool." To the artist, light and shade mean something more than sun and cloud. Star and silvered wave and funeral march lead the poet to conclusions that escape the scientist and the philosopher. We may, therefore, logically conclude that it is not so much the thing seen or heard that matters, as what lies behind it—what it suggests. Unless thought minister to sight, the presentation of the artistic and beautiful will, "like the baseless fabric of a vision, leave not a wrack behind."

The esthetic faculty—and by faculty I mean the soul itself operating along particular lines of action—is developed by judicious exercise, which consists in frequent contact with its appropriate stimulus, beauty. The first and essential property of beauty is that it gives pleasure. If the cultivation of the esthetic sense be taken to mean merely the strengthening of man's power to experience sensuous delight, the utilitarian will clamor that such culture does not come within the province of the public school. He will hold up its advocates as impractical theorists, guilty of provoking discontent by sharpening tastes that can be rarely satisfied and of wasting the taxpayers' dollars on needless polish, shallow sentimentalism and enervating hedonism.

But esthetic culture aims at more than the mere pursuit of beauty for beauty's sake. It has its use, its practical value for the individual and for the nation. It blends the *utile cum dulci*. One of the fundamental principles of Gothic architecture is that no ornament may be introduced for the mere sake of ornament. The same principle we all recognize in education. God has created nothing aimlessly. Everything in nature, beauty included,

has its appointed mission—to lead to something higher, better than itself; and art, whether you call it imitation or interpretation, must have a similar purpose—a vivifying ideal. If its aim is merely to please, then we must look for a still further purpose in the delight it awakens. "Wherever there is pleasure," says Mr Compayré, "there is love." In cultivating, therefore, the esthetic taste we shall not only make our pupils appreciate the beautiful, but love it, not alone in the material order but in the intellectual and moral order. As a result the cities and villages, the public buildings and public parks of the future will be more artistic, more attractive, better suited to make the American feel there is no land like his own.

Esthetics will aid us to lift life from the low level of a struggle for food and bodily comforts to the higher plane of aspiration for nutriment of mind and soul. It will throw such a halo round the home that parent and child alike will prefer the comforts of the domestic hearth to the coarse and demoralizing attractions which today threaten American home life. Among the home lovers we must look for our patriots, for patriotism is but the love of home projected to the confines of the land whose government protects the home.

Now that we have become a world power and aspire to bear the torch of civilization to other lands we must carry to the foreign shore more than the product of mine and mill, of farm and forge. We must maintain our prestige with something besides multitudes, dollars and cannons.

So far, then, from promoting discontent with existing conditions, the refining of the esthetic taste will broaden the mind, chasten sentiment, strengthen family ties, foster patriotism and justify to some extent our claim to be missionaries of civilization. A fully rounded, symmetric education supposes the cultivation, not alone of the illative faculty, but of the moral, the esthetic and the religious sense as well. The desire and effort, therefore, of our public schools to cultivate and refine the esthetic side is a step in the right direction and most deserving of approval and encouragement.

The consideration of the best practical methods for imparting this culture I must, through lack of time, leave to the other gentlemen who have been appointed to discuss this question. Briefly I would make a few suggestions before closing: first, let the walls of assembly hall and classroom be harmoniously tinted, restful to the eye and cheery; second, pictures and plaster casts should be freely called into service and kept before the eyes of the student. It were well to change the position of exhibits now and then so that pupils in each section of the room may have an opportunity to view them easily at close range.

Just here three difficulties confront us: first, the money necessary to purchase the pictures and casts; second, the selection of suitable models, and third, the method to be followed in putting them before the pupils so as best to awaken an appreciation of artistic beauty. The cost of the necessary art exhibit need not be extravagant. We can not hope for originals. Good copies can, as a rule, be procured at reasonable rates. The selection of proper subjects is more difficult. On one hand, not all of us are competent judges in the matter; on the other, few of us are in easy reach of a well supplied art store. A committee might be appointed from this body to guide and assist us in procuring the best for the least. Suggestions as to the proper method of producing the desired results will doubtless be furnished in abundance as soon as it is understood that our schools have earnestly entered on the work.

Would it not be possible to induce the regents to procure a supply of art productions to be circulated among the various high schools and academies, as is now being done with specimens of drawing, books and stereopticon slides? The arrangement would add freshness and variety to the work and prevent the apathy and indifference which prolonged familiarity even with beautiful things is apt to induce.

Music is one of the most available and efficient agencies in the province of esthetic culture. Vocal music should be taught in every school. For most of us it will play a more prominent part than any other single influence. The blending of human voices

in harmony has an esthetic charm even for the unlettered and uncouth. School choirs or glee clubs properly guided in their selections would prove a desirable auxiliary.

In addition to the above we have drawing, botany and astronomy, subjects already included in our present curriculum. It is needless for me to descant on the opportunities offered by each of these sciences to develop and refine the esthetic nature. They open up to the pupil's soul the world of art, ancient and modern, with its wealth of ornament, beauty and suggestion. Architecture reveals the wonders of constructive art which man's ingenuity has builded, while botany introduces us to the masterpieces which the Divine Artist has made to spring from the soil and has arrayed in splendors that outshine all royal glory. The beautiful and the sublime—where could we find them if not in the blue fields of the heavens, where the power, and wisdom, and majesty of the All-beautiful are written in astral fire.

In our generation, the world has heard and learned much of anesthetics. It is time that esthetics should have a hearing.

Friday afternoon, 27 December

IS THE FINISHED PRODUCT OF THE HIGH SCHOOL EFFICIENT, UPRIGHT AND COURTEOUS; IF NOT, WHY NOT?

Prin. M. I. Hunt—In a convention composed as is the present one, largely of men and women actively engaged in the work of secondary education, agreeing as we probably do as to the ideal end of that education, unless willing to confess ourselves failures in our profession, there is but one rational answer to the question. To answer it in the negative would be to impugn our own efficiency and to question the wisdom of the communities employing us.

In forming an opinion as to the efficacy of any means to produce a desired end, three things, chiefly, determine our conclusion, our ideal of the end desired, our knowledge of the material used, and our conception of the limitation which nature and environment place on individuals. Let me say at the outset that

no system of education can uplift an individual against his own will; neither high school nor college can guaranty specific results without the inclination and cooperation of the individual. As an eminent educator has declared, "Education strives to give to the individual all the perfection of which he is capable, the attainment of perfect manhood as the actualization of the freedom essential to mind, to unfold and direct aright the whole nature, to call forth powers of every kind. Education does not create, it can only unfold or draw out, it evolves what is involved by the Creator. It may increase the efficiency of the native endowments but it does not add to their number."

Broadly speaking, the aim of education, the defense for its support by the state, is to make each citizen capable of contributing to the utmost to the material and intellectual wealth of the state and to "enjoy to the greatest possible degree both his labor and his leisure" (*Prof. Hanus*) In all that contributes to the happiness of the present life—its material, intellectual and social development—the state, and therefore the public school supported by the state, is concerned. Effectiveness, courtesy and unrightness are, therefore, essential qualifications in the finished product of primary, secondary and higher education, differing only in degree. Effectiveness is required to satisfy our obligation to the state; courtesy, our relations with our fellows, and uprightness, because without the approval of his own sense of right no man can enjoy happiness.

I answer the question therefore in the affirmative and present the following reasons for my belief. From the time the pupil enters the high school till he graduates, his environment tends to develop the qualities named. I mention the building, the course of study, the spirit with which he is regarded by the lower grade pupils, and the community. The high school building is frequently a model of architecture, a study in beauty and symmetry. The interiors are annually becoming more beautiful and more artistic. Pictures and statuary rouse noble thoughts and high ideals. They create a desire for, and a determination to possess. Purposes are formed, will is stengthened. The pupil realizes that success comes only through effort.

High school libraries are yearly enlarging, and the best thought of all ages and all tongues is made accessible. In history and literature the pupil is brought into contact and sympathy with the most heroic characters and the loftiest ideals of the human race. He is measurably influenced in thought, in aspiration, in will by these ideals. They become fixed and develop permanent habits of thought and action. During the four years of his high school course he is daily meeting difficulties and daily overcoming them. The obstacles encountered and overcome strengthen him in will and intellect and develop confidence and power. Treated courteously by his teachers and associates, he responds courteously.

Need I do more than mention as a factor in producing the desired results the self-respect which is produced by the regard in which high school pupils in the upper classes are held by those below—the heritage which is theirs from the success of earlier alumni of the school, the spirit of *noblesse oblige* which comes to graduates as they realize that the eyes of the community are on them and desire their success in life.

Under the awakening and inspiring influence of the high school the boy who entered with no definite notion of what he wanted, with no special liking for any occupation or calling, finds himself with a taste for some particular line of work and an ability of which he was not previously conscious, and he leaves school with a definite aim. I think those present who have interested themselves in the hopes and ambitions of boys and girls will bear me out in the assertion that few entering the high school have any fixed and definite object. The first essential to success in life is to have an aim. Few graduate without this aim. If the high school does nothing more than aid an individual to realize himself—to become conscious of his own latent power—and give him a definite aim, it justifies its existence.

But what of the graduate just leaving the high school? We call to mind the alumni of our high schools. Where are they, and what are they doing? Who fill our professions? Largely, the graduates of high schools and academies are filling the pro-

fessions in law, in medicine, in the ministry and in teaching. The great men of the last century will credit much of their success in life to the influence of the old-time academies. And the modern high school, more accessible to the majority of boys and girls, better equipped with library and apparatus, with a more highly trained class of teachers, is to give the impulse of the future. Where do we find men, more effective, more courteous, more upright, than professional men? They are the leaders in the social, the civic and the intellectual life of every community. Who shall question the power and value of the high school in contributing its share to this result?

Are the opportunities which the high school affords utilized by the majority of its graduates? Our business men think so. Effectiveness, courtesy and uprightness are the qualities they demand in their employees. Many high school principals will tell you that there is a constant demand for graduates for employment by business men—a demand greater that the school can supply. Our higher institutions of learning think so, for the tendency of the times indicates a constantly increasing demand for the high school diploma as a requisite for entrance to normal schools, colleges and technical training schools. Our communities think so; witness the increase in high schools in the Empire state during the past decade, and the large increase in appropriations for secondary education. People have confidence in the work high schools are doing and they have faith in high school teaching.

But we may be told there are many who fail to reach our standard. Out on the Onondaga reservation a few years ago a missionary teacher and minister was complaining to one of the men of the tribe about his son's work. Said the father, "I know he does not take easily to reading and he is poor in figures and he will cheat if you don't watch him. But your struggle with him will make my grandson and my great-grandson far better men than either my boy or myself." There is more optimism in that sentiment of the old Onondaga than there is in Holmes's oft

quoted remark, "The education of a boy should have begun with his grandfather."

Moreover, if here and there a graduate disappoints us in his failure to justify our ambitions, it may be we are fixing a standard too high. The standard of excellence for the high school graduate should be greater than that for the grammar school. But it should certainly be less than that for the graduate of the college or technical school, or even the grammar school plus years of experience and struggle. Our graduates are boys, not men. They have only the strength of boys well trained and well developed, physically, mentally, and morally. If occasionally they fail they are only obeying an almost universal law, for failure is more common than success. It has been said that every child is born to an inheritance of ruins. 90% of our business men become bankrupt sometime in life. Few professional men will acknowledge that after years of struggle they have yet reached the goal of their ambition.

Let us then have done with disparagement of the high school course and the inefficacy of the high school graduate. He is a better man because of his high school education and a far more potent factor in the moral and material upbuilding of the state.

Inspector John C. Bliss—This is one of the most important questions that we as schoolmen can ask ourselves. It amounts practically to asking whether or not our school system is a success. As the gentleman who preceded me has said, there are very few of us who would like to pose as failures, but I think there are few even of the most enthusiastic who will claim that their schools are an unqualified success. It is a question on which much can be said on both sides. Is the high school graduate courteous? I think in the main that he is. We have doubtless all had the same experience; we have found in our school work that he is usually respectful, that is to say, outwardly at least, courteous. I think we have all found that the disagreeable traits in children are due very largely to lack of courtesy on our part. In the lower grades we treat children as such and they are content, but as they grow older and in-

crease in self-respect and self-importance, as they should, is it not possible that we sometimes fail to realize the changed conditions? A boy of 14 can not be treated like a boy of 6. He is quick to feel kindness and courtesy on the part of the teacher and equally quick to feel lack of appreciation. Most teachers realize this and consequently few find their pupils discourteous.

But that is not all. If the purpose of education were for school life only, it would not be a difficult matter in these days to teach school; it would not be a hard problem to get good work done and have at the same time friendly and pleasant relations between teacher and pupil. But our work is far broader than this. We are to fit pupils not specially for school life but for all the relations of actual life; and just as life among men differs from life in the school, so the boy at home and on the street and in the crowd is different from the boy at school. We find that he is courteous here, but it is a matter of common opinion that elsewhere he is quite different; that while he may have a veneer of civility, nevertheless he is lacking in respect for authority, for age, and in reverence for things that are holy. We must admit that there is some truth in this. There is no opportunity here to discuss this matter, but it is some satisfaction to know that the fault is not entirely due to our methods of education. I believe that the schools are doing more than any other one agency to develop respectful, courteous men and women. But the schools can not do the work alone; there must be a revival in the home of that old-fashioned discipline, loving but firm; that discipline which today has so often lost its firmness. The church must pay greater attention to the practical application of its teaching, and finally in addition to what the schools have done and are doing, we teachers in every word and in every act must show forth the true gentleman, courteous and respectful to all.

Again, the high school product is upright and honest, and may be depended on in school and in society. There are exceptions; there always have been and always will be dishonest members of society; but if we give the boys and girls half a chance they

will not disappoint us. Our shops, our factories, our offices and our countingrooms are largely filled with young men and women, the product of our high schools. In many instances they are in positions of trust and responsibility of persons of far maturer years. This would not the be the case if they were not upright and efficient. It is true that we are very frequently shocked by reports of embezzlements and defalcations, and we sometimes wonder how these things can be if our school training is what it should be. But these conditions are due to that extravagance in life which is tolerated by society rather than to anything else. The boys and girls do not get these ideals in the schools; the school ideals are high and those of society ought not to be any lower.

Is the high school product efficient? The answer will depend very largely on the standard of measure. Ability is not a commodity that can be measured by rule nor can it be reckoned in terms of dollars and cents. Each individual determines in terms of his own selection the standard of ability required of others. The lawyer judges the high school graduate from one standpoint, the business man from another and the college man from still another. Each one believes that his own standard is the correct one, but all agree that they know more about the management of a school than those who are giving their lives and energies to the work. And all this because the four short years of a high school course do not familiarize the boy with all the details of a dozen different lines of activity.

This is all wrong. It is not the function of the high school to turn out expert stenographers or carpenters or business men or lawyers or farmers, if you please, nor is it primarily a fitting school for college. Rather should it endeavor to develop all the faculties of the individual, the mental, moral and physical qualities, and train him to accurate habits of observation and thought, so that when he leaves the school he may adjust himself to his environment and, after a reasonable amount of experience, succeed. If a technical education be necessary to success, as it so often is in these days, let it be obtained in the

technical school. Judged by this standard our schools are doing good work and our graduates are fairly well equipped to go out into the world. That they do succeed we know from our own experience and our own observation. But we must remember that when they leave the high school they are boys and girls and we can not expect from them at once the work of adults.

While it is true that the schools are doing good work, it is also true that they may do better work and that our high school graduates may be much more efficient than they are. If this were not true there would be little incentive toward school improvement. This betterment I think will come not so much through improved courses as through improved methods. We have been tinkering too much with courses of late and we have come, unconsciously perhaps, to strive after quantity rather than quality. I think that in the future we should pay less attention to extent and more to intent, less attention to the mass and more to the individual, and that we should insist on thoroughness before all things else. There is room for changes of this sort in all our schools.

Each institution has its own problems and must work them out in its own way. There are two classes of schools, however, that are specially unfortunate. These are the large city high schools and the small village high schools. As in city life, so in the city high school the individual is lost in the mass. In spite of the best efforts of boards of education these schools are almost invariably overcrowded and the best qualified and the most earnest teachers can give little more than mass instruction. There are too few opportunities for the inquiring student to push his investigations to an end and there are altogether too many opportunities for the indifferent, lazy student to shirk his work. Sup't Kennedy appears to have devised a remedy for this in his system of individual instruction which has worked so well in Batavia and some other places. This plan is not a panacea for school ills, but it ought to result in a greater efficiency of the teacher and of the pupil.

In the small village opposite conditions prevail. There the resources of the community do not permit nor does the number of students require a large teaching force, and yet almost invariably the requirements for graduation are just as high as in the more favored communities. The result is an overcrowded program and an overworked teacher. As a consequence subjects are given one half or one third the time they require, while many are simply studied at home; except in the case of what we may call the standard subjects, study often becomes a mere cramming process. Now I know that this is a somewhat delicate subject and I do not wish to be misunderstood. All small high schools are not of this sort; many of them are doing a splendid work and are among the best in the state; but these conditions do prevail in a large number of such schools, and where they prevail a high grade of efficiency and thoroughness is impossible. In such cases as these retrenchment is needed. In educational matters as in all others we must be guided by our resources and our needs.

In conclusion, I think that our high schools are doing a splendid work, that our graduates are young men and young women of whom we may well be proud, but that there can be increased efficiency and thoroughness in nearly all schools, and that this will come through a closer connection of the church and the home and the school, through a clearer view of the responsibility of the individual teacher and a greater appreciation of the value of the individual pupil.

Pres. B. W. Hutchinson—The question is so broad and general that a categorical answer can not safely be given. It would be a more appropriate question at the close of a college than of a high school course.

The average graduate of the high school shows some points of both strength and weakness. Some high school graduates have the three qualities, efficiency, uprightness and courtesy, and some have not. Almost every graduate has one or more of these qualities in some degree while comparatively few have them all in a high degree. The fault may lie in the high school

it may be due to other causes. In order to form a correct lgment we should not expect too much or too little of the ;h school.

Che writer has had the privilege of receiving a considerable mber of high school graduates from various parts of the ite for an additional year of study. These graduates are of sorts; some well trained and some indifferently trained; me with high moral purposes and courteous bearing, others :king greatly in both these qualities. He has not been accus- med, however, to hold the high school responsible for these ortcomings in every case.

The boy or girl who comes from our high school is sometimes fficient, upright and courteous" in the cold and formal sense ly, while lacking in originality, breadth and resourcefulness. s efficiency is that of a machine—without heart—and runs in very narrow groove. He is helpless to grasp real conditions large possibilities; or he may have the qualities of efficiency d formal uprightness while he lacks high moral purpose and ds a cold and selfish life. His uprightness may be of the ictly secular or commercial type which knows not the love ıumanity.

ow all good qualities are not found in perfection in boys girls just out of high school, but the foundation on which ıild should be there. This brings us face to face with the nportant ethical significance of the academic years. The students are thrown together in their mode of life, the opportunity they have for learning good or evil. The ıg together of students in dormitories may be either a ıg or a curse or somewhat of both, according to the man- ıt and the atmosphere which prevails in the school com- . The student body of the high school, being usually p of those who live at home, is influenced much less by ool atmosphere and more by the home atmosphere. In ords, less depends on the character of the school and the character of the home in determining the results chool training than is the case with boarding school

training. The student spends say four or five hours a day in the schoolroom of the average city high school. Under these circumstances he can not be influenced so strongly by the school as the student who lives in a boarding school which makes its own distinctive moral, social and intellectual atmosphere. The principal influence of the high school is probably intellectual while the moral and social elements are left to be supplied by the church and home.

To what relative extent the high school and the home shall respectively be held responsible for any defects discernible in the product of the high school, is a difficult question. The school may properly be held to answer for intellectual and scholastic defects while the home has far the larger influence on the general character. The ideal home supplemented by the ideal school would secure the largest and best results; and these conditions should be able to produce efficiency, uprightness and courtesy in every instance. The nearest approach to these conditions is probably in the case of the student who lives in the ideal home or in the ideal boarding or family school.

Whenever the product of the high school is seriously at fault and such fault is justly chargeable to the school, it must in almost every instance be laid at the feet of the teacher. The teacher makes the school. His personality and character determine the school atmosphere and give color to the finished product; that is to say, the personal influence, direct or indirect of the mind or personality of the teacher is most important in all education. The word personal here is not confined to moral and social life, but includes all the qualities of the intellect. The most common defect is not that of scholarship or mental training but rather of low or unworthy ideals, a lack of inspiration for the highest and noblest ends of life. For the true schoolmaster is always a moral teacher whose ideals and character largely mold and fashion the lives of his pupils. The teacher who fails to grasp this truth and to be inspired by it may be a good machine instructor, but is as yet only on the

border land of the teacher's province. The most delightful experiences of the profession are for him still in the future.

Even the excellent and highly efficient system developed by the regents and peculiar to New York, when worked by a mechanical teacher of routine ideas, is in danger of turning out a forced, artificial product, with powers stultified rather than developed. The only efficient remedy for this evil is that the teacher himself be born into a new world, spiritual and intellectual. His children from the high school will be begotten after his own type and will see life from his viewpoint. He must be a fountain of inspiration or he will be a failure. His soul should be stirred to its profoundest depth by the very sight and presence of these young people. He lives for them and will live *in* them for the years to come.

WHAT OF CHEMISTRY SHALL BE TAUGHT IN THE HIGH SCHOOL AND HOW SHALL IT BE MOST EFFECTIVELY TAUGHT?

Prof. L. M. Dennis—It was with some misgiving that I ventured to accept the invitation of your president to speak on the teaching of chemistry in the high school. It having been my privilege to be connected with the training of high school pupils before I came into university work, I thought it might be of interest perhaps to present the ideas of one who has seen both sides of the question; who has been connected with high school training and has taken the high school student through the four, six or eight years of university work afterward.

I suppose that most educators are agreed that instruction in at least one of the natural sciences should be included in the curriculum of high schools and preparatory academies. Among these sciences physics and chemistry occupy positions of prominence and instruction in one or both these subjects is usually offered. Before speaking to the question, "What of chemistry shall be taught in the high school and how shall it be most effectively taught?" let us consider for a moment the conditions under which it is desirable to teach both physics

and chemistry in the high school and which of the two sciences should be selected if only one is to be offered.

There are two distinct aims in the teaching of science in the high school. The first of these is the cultivation of the habit of close observation and of accurate deduction from observed phenomena; the second is the imparting to the student of information intended either merely as an addition to his fund of general knowledge or as preparation for advanced work in this line in some higher institution of learning. Regarding the first point, it is, I believe, true that a scientific habit of thought may be equally well developed by properly conducted courses in either physics or chemistry, yet instruction in physics should precede that in chemistry, because an understanding of the phenomena of heat and electricity and of the laws of mechanics will be of great aid to the student of chemistry and is indeed an almost indispensable preliminary to the profitable performance of his work. If then in arranging the course of study for the high school it is felt that time can be found for only one of these sciences, physics should undoubtedly be given the preference.

Touching the second point, the imparting of information to the student, it will generally be conceded that if the education of the student is to terminate with the high school course, the knowledge that he will acquire in the study of physics will be of fully as great utility to him in after life as that derived from a course in chemistry. The instruction which can be given in a high school in either of these branches can not make of a student a physicist or a chemist. Consequently it is futile to argue that a high school preparation in one or the other of these sciences will be sufficient to enable the pupil to use the knowledge thus acquired as a means of gaining a livelihood, and that consequently one who is intending to fit himself as a chemist should receive in the high school instruction in chemistry even to the exclusion of physics. No one can hope to become a properly trained chemist unless he is thoroughly grounded in the other science. As has been said by one of the greatest

teachers of science of the preceding century, "a chemist who is not a physicist is nothing at all." Hence there will be no gain in time for the student of chemistry if he be given chemistry instead of physics in the high school, for instruction in the latter subject must be received either then or at some later time in his training. It would seem, therefore, that whatever the aim in view, the curriculum of a high school should first of all provide a thorough course in physics, accompanied by laboratory instruction, and that chemistry should be taught only when time will permit of its following a year of training in the other science.

This brings us to the question of the "what" and "how" of the chemistry to be offered to the high school pupil. If the teacher is well fitted for the work and the facilities for class-room and laboratory instruction are adequate, no branch of science will prove of greater profit and interest than chemistry to the student properly prepared to undertake it. The preparation of the teacher should include at the least a year of lecture, recitation and laboratory instruction in general inorganic chemistry amounting to about six actual hours a week (or the equivalent of such a course) together with a full year devoted to qualitative and quantitative analysis. If this can be supplemented by training in elementary organic chemistry and a brief course in physical chemistry, the effect will soon be made manifest in the greater success of the teacher, a greater power to make the subject a "live" one to the pupil, and in the greater enthusiasm and clearer understanding on the part of the student.

Yet no matter how complete may have been the training of the teacher, it is hopeless to expect to obtain satisfactory results if suitable laboratory facilities are not at hand. And it is exactly in this respect that many of the high schools in our smaller cities and towns labor under serious disadvantages. A laboratory for instruction of physics can be installed in a room of usual construction and can be equipped once and for all by the purchase of a suitable stock of apparatus. A

chemical laboratory on the other hand should be specially planned for the purpose for which it is to be used. It must have large table space, a more or less elaborate system of plumbing, adequate ventilation not merely of the "hoods" for carrying off noxious gases, but also of the entire room, and it must be equipped with a large stock of chemicals and fragile glass apparatus which must be constantly renewed. If the money available for the teaching of science in the high school is not adequate to properly construct, equip and maintain such a laboratory, then again it will be wiser to concentrate on physics rather than to attempt to offer chemistry under unfavorable conditions.

The course in chemistry should first of all comprise a full year of work in general inorganic chemistry with experimental lectures, laboratory practice, and recitations. It is unfortunate that in certain schools some qualitative anaylsis is included in this first year of chemistry; the time is none too great for the inorganic chemistry alone, and the small amount of qualitative analysis that can be given in connection with the inorganic chemistry will prove of but little benefit to the student. If anything is to be added to the inorganic chemistry in the first year let it rather be a brief study of the commoner compounds and processes of organic chemistry.

Both in the lectures and the recitations it is inadvisable to make early use of symbols or formulas or of equations to express chemical reactions. If the student begins with the study of hydrogen and prepares that gas himself in the laboratory, we should not insist that he learn at that time either the formulas of the substances which he uses or of the products which are formed. At this early stage it is quite sufficient that he know that zinc and sulfuric acid when brought together will set free a gas that is termed hydrogen and that he then ascertain the properties of this gas by actual experiment.

As preliminary to the work of the laboratory brief instruction in the setting up of apparatus should always be given by the teacher. Students should be shown how to draw out, bend,

and join glass tubing, how to clean chemical glassware and how to properly support the different pieces in position. Skill in the handling of apparatus is a most essential acquisition for a chemist and proper training in this matter thus early in his career will save him from many vexatious delays and even failures in his later work. At the beginning of each period of laboratory practice the teacher should explain to the class what is to be done and should set up the apparatus that is to be used. Each student should then be required to neatly and properly put together the apparatus for each experiment, following the model which has been shown to him. Careful observation and accurate statement of experimental results by the student should be cultivated, and he should be impressed with the importance of "experimental honesty." By that I mean that he should be encouraged in stating exactly what he has seen in the experiment and should not be given the idea that if his results do not agree with the statements in the textbook, his work will be regarded as a total failure. The experiment should of course be repeated till proper results are obtained, and the understanding of the reasons for the failure and for the subsequent success will then double the value of the work to the pupil. Indeed many chemists are wont to say that more can be learned from an experiment that has "failed" than from one that has succeeded, and it is a fact that some of our most important discoveries have thus been made. Training in accuracy of manipulation, observation and statement should therefore be the first object of the teacher, and a carelessly performed experiment which happens to agree in its results with the statements in the textbook should be regarded as half a failure.

I trust that what has been said will not be regarded as in any way intended to discourage the teaching of chemistry in the high school, when the conditions are favorable. On the contrary, it is earnestly to be hoped that the instruction in this subject will be constantly extended, provided always that it is of a high standard of excellence and is offered to students properly fitted to reap its benefits.

Vice-prin. E. R. Whitney—The high school has two functions, the first of which is preparation for college. Fully three quarters of the colleges now allow chemistry as an entrance requirement, among the number being Harvard, Smith, Woman's college of Baltimore, Vassar, Wells, Syracuse, Wellesley, Rochester, Cornell, Massachusetts institute of technology and Amherst. Many a student in our own school has had his mind turned collegeward by interest aroused in the high school chemical laboratory. Then second, the high school must give as liberal an education as it can to the great body of students whose academic instruction must of necessity end with the high school. This is the high school's chief function. Chemistry should be taught to this class of students if we would discover their latent talents, transmit knowledge, or give them the elements of a liberal education. If chemistry has any educational value in the college, it has to the students who can not attend college, the same in the high school, proportionate to the time given it. The elements of the subject are not too difficult for mastery by students of high school age. I am of the opinion that more preparatory students ought to offer chemistry for entrance to college than do now.

Many college professors as well as high school teachers are firmly convinced that the proper place for beginning chemistry is not in college but in the high school, for at that time the pupils, specially the boys, are "surcharged with an active interest in material things whose presence and forms and activities have made up their life." Too often the period of experimentation that comes to every youth is passed by, uncultivated, before the student reaches the sophomore or junior year of college, when the subject is usually taken up. In some city high schools the students have as efficient a teacher and as good a laboratory as they would have in some of the colleges where the instruction is largely given over to tutors. The danger of postponing the beginning of chemistry to the college years is shown in the answers to a question asked by Prof. Remsen of

a boy, and by no means a very remarkable boy either. He asked him if he had any reason to believe that air had anything to do with fire. The boy said, "Yes, I think I know one reason." "What is it?" "Well, if you cover the fire up it will go out." Prof. Remsen asked the same boy the same question a few years later and the young man answered: "Let me see; I do not think we have had that yet." This is only one example—alas, there are too many—of our losing communion with mother earth. As Dr Remsen tersely puts it, "The relationship is changed, she becomes our grandmother." You may force carnations to bloom at Christmas and azaleas at Easter, and you may freeze water in July, but nature will not aid you. Truly there are times and seasons in the intellectual as in the physical world. It is claimed that "youth begins with perception and memory predominating; then in a few years imagination becomes paramount and the reasoning part of the intellect becomes distinctive about the 17th year." Just at this time, when the mind is sufficiently ripened and before it has become set, chemistry should be taken up. In most cases mental habits become fixed before the student leaves the high school.

No better answer to the question, "What of chemistry shall be taught to students preparing for college?" can be given than is contained in document 2 of the College entrance examination board of the Middle states and Maryland, to which you are referred and in which you will find a complete outline of the indispensable things to be studied in the classroom and in the laboratory. (It may be obtained by sending stamps to Prof. W. E. Waters, substation 84, New York.)

Two years ago this month the committee of nine of the New York state science teachers association submitted a report to that association covering the ground under discussion. The unanimous adoption of that report indicates the remarkable consensus of opinion of the science teachers of the state as to what of chemistry should be taught in the high school and how it should be taught. The association then set up a standard

of excellence to be attained, and an ideal that would aid in uplifting science teaching throughout the commonwealth. That ideal has not materially changed since the presentation of the report two years ago. I believe that the syllabus given in that report is sufficient for meeting, not only the college entrance requirements, but also the far greater demands of the student who can not attend college.

Effective teaching of chemistry requires at least five things: 1) a teacher; 2) a classroom, fitted with lecture table appliances for use of the teacher in giving expositions, lectures, or experimental demonstrations; 3) an elementary textbook, preferably by a secondary school man—a book that is not a fragmentary treatise or an abridgment of a larger work, but a continuous outline, clear, exact, logical, and mainly inductive. A student provided with such a book will scarcely need to take notes of the demonstrations, which high school students do so poorly, and thus can give his undivided attention to the explanations given; 4) a well equipped laboratory for individual work for use of students; 5) a laboratory manual comprising a course of carefully selected and arranged experiments to be performed by the students under the direction of the teacher. I do not approve of giving students laboratory manuals and turning them loose in the laboratory. Personal supervision is essential for the formation of correct habits. These five requisites, with the possible exception of the books, should be provided by the school authorities. Unless these essentials are supplied, chemistry should not be taught in that school and the energy might be better turned in other directions. It should be evident to all that no workman can make a finished product without the necessary tools and it is folly to expect that a great subject like chemistry will have its full and special educational value realized with imperfect teaching.

The teacher should not only have a thorough general training but also a taste for science studies in general and chemistry in particular. He must be competent to master the details of laboratory and classroom management—details of manner and

method of experimentation, manipulation, etc. Let us have a live teacher, one who can not only instruct, but who can inspire; for inspiration always outlasts instruction. Such a teacher will make the laboratory and classroom pleasant places. He will not only teach the students the right way to learn, but will do more; he will induce in them a love for knowledge. He will make use of the unusual events in which the laboratory abounds in making deep and lasting impressions. But this teacher must have time for adequate preparation for every lesson, every experiment in the lecture room, and every period devoted to laboratory practice. The principal who compels the science teacher to teach so many branches or so many periods that no time is left for preparation of experiments, removal of apparatus, etc. is grievously at fault.

Suffer me to use the remaining minutes allotted to me in giving to the teacher of chemistry nine hints tested in my own experience.

1 All three divisions of the work—the lesson with experiments by the teacher, laboratory practice by the students and recitation on book and laboratory work—should be unified and closely coordinated.

2 The illustrative lesson should precede the student's work in the laboratory. I presume not all science teachers will agree with me on this point. It seems to me, however, that a secondary school laboratory exists for the purpose of confirmation rather than for discovery. The lecture table experiments should be largely illustrative and demonstrative, with an occasional determinative experiment. In the laboratory, verificative experiments ought to preponderate. Quantitative experiments are exceedingly valuable, both in the lecture room and in the laboratory, but if used to excess are decidedly deadening in interest. Mixed with other kinds, they are helpful tonics. "The beginner has not the spirit of investigation." Nevertheless quantitative experiments are the basis of all real advance in both physics and chemistry and while such experi-

ments consume more time than purely qualitative ones they are worth more.

3 A searching quiz in the classroom on the lesson and laboratory work has most beneficial results.

4 A question put by teacher to student doing an experiment suggests new thoughts. The teacher can do more stimulating by judiciously asking than by answering questions in the laboratory. Students naturally shirk brain effort and if no textbook is handy (and none should be) will draw on the teacher. It is generally acknowledged that the laboratory trains the senses. It ought to be a "place for thinking as well as seeing."

5 Under no condition should laboratory practice become a substitute for hard study of a textbook, or for strong instruction and vigorous interrogation in the classroom.

6 It matters not whether chemistry precedes or follows physics, if only it comes as late in the course as possible.

7 A year of 40 weeks is none too short for the course. Each week there should be two double periods of 90 minutes each for laboratory practice, and three single periods of 45 minutes each for classroom exercises. I would divide the time as follows: lesson with experiments, two fifths; laboratory practice, two fifths; quiz on lesson and text and discussion of laboratory results, one fifth. Even more work and less talk would be better.

8 A wretchedly done experiment, poorly recorded in the notebook, is an abomination not to be tolerated. A slovenly kept desk forecasts a poor housekeeper, a slack business man, an indifferent artisan, a careless and therefore dangerous professional person. Such loose habits can and should be eradicated in the laboratory, even if it does hurt when the roots of the weeds snap.

9 Make constant use of the fact that chemistry belongs to the actual affairs of life as well as to the school curriculum. Topics like these—cheap power, steel-making, the production of aluminum, electric vs steam heating, petroleum, anesthesia,

composition of soils, analysis of milk, boiled water, etc. will suggest themselves. We must remember that those who do not go to college become artisans, engineers, skilled mechanics, lawyers, doctors, clergymen and even teachers and that it is seldom that those who get even part way through the high school become ordinary laborers. The high school should be on the alert to discover latent tendencies and aptitudes and strive to develop them and as no one set of subjects has a monopoly on culture and as each set attacks centers differently it is evident that every student should have at least a bite of each in order to determine whether he has a taste for it. How else can you find out? The educational value of any subject may be accurately judged by the amount of interest aroused. Apply this test to chemistry and what subject arouses as much?

Laboratory practice, in addition to training the observing powers, gives valuable manual training and constantly strengthens the critical faculty, and a poise and stability are often secured not gained by any other school exercise. While it is true that "manual dexterity begets mental agility" it is not the physical and intellectual qualities alone that are trained in the chemical laboratory. The laboratory has ethical lessons also. No shamming, no deceit, no carelessly made promises will shield him who breaks a law of nature. Transparent honesty, patience and economy are impressed in every step.

The time for extending the laboratory method into all schools where chemistry is taught has fully arrived, because, to use the words of Carhart, "secondhand knowledge has taken a secondary place compared with information gained at first hand. The sovereignty of the textbook has yielded to the sovereignty of nature. Knowledge by authority is giving place to knowledge by conviction."

Henry H. Denham—It is with a feeling of some diffidence that I stand before so many teachers whose experience far outreaches my own, but that feeling is more than compensated for by my

gratification at the honor your president has done me in giving me this opportunity of addressing you. I realize, of course, that the enthusiastic chemistry teacher is prone to forget not only that his course is not the sole one of importance in the secondary curriculum, but that his classes are not made up entirely of future chemists or indeed of pupils destined to further education. If in what I say you scent a tendency to overlook the value of other studies, I beg you to consider that it is only a teacher of chemistry who stands before you.

Owing to the shortness of time allowed me, I shall pass over certain important points in chemistry teaching because they apply to the teaching of any branch and are, I think, so generally accepted that a discussion of them would be superfluous. It is almost axiomatic to say that no preparation or training can be too complete for the competent teacher of any subject. Likewise it is, I believe, agreed by all that not less than an hour and a half should be allowed for laboratory practice; and in that statement I take it for granted that a laboratory is considered essential to satisfactory work.

At the outset I must urge on your consideration the fact that the science of chemistry was not evolved from the inner consciousness of the textbook writer, and that the history of its growth is fraught with the keenest human interest. The stories of the lives of Priestley, Cavendish and Lavoisier are very far from being devoid of interest to young minds or to old ones. There is no more reason why the names and lives of these heroes of science should be consigned to oblivion, than those of the famous leaders in military or political events. A brief outline of the phlogiston theory is an object lesson of rare value on the possibilities of reckless theorizing, and taken in connection with a study of the chemistry of combustion, appeals strongly to the average pupil, specially after he has demonstrated by the use of the balance the real relations of metal and calx. Let us not then entirely neglect this important phase of the subject, which is at once a relief to the possible monotony of systematic work and a stimulus to the energies of even an unimpressionable student.

I think that I may say without arousing serious discussion, that the aim of modern education, primary, secondary and university, is to teach the pupil how to learn. Unfortunately there is still too much tendency on the part of teachers to inflate the student's memory with easily forgotten facts and fancies, very much as a balloon is inflated with gas. The consequences of this are easily observable everywhere; the student goes to future teachers with little or no capability of reasoning from observations and not the slightest desire to do so. Of all studies in the high school, it seems to me that none are better adapted to training the intelligence than what we commonly call the natural sciences, and yet there is a regrettable tendency on the part of many teachers to pursue the same cramming methods in these subjects that are so useless in others, save for the fact that they enable the willing victim to pass an examination of a certain sort.

Whoever coined the glib phrase, "The high school is the people's college," unwittingly worked a great deal of harm among the ignorant and unthinking, in that he created the impression that when a boy emerged, diploma in hand, from his black suit and white cravat at the end of the commencement exercises, he was moderately well prepared to immediately disgorge his accumulated store of facts to the benefit of his pocketbook and of the world at large. I think that we may ascribe to this feeling the tendency we meet with in "people's colleges" to make dictionaries of applied science out of mentally normal boys and girls. The memorized details of the technical preparation of sulfuric acid or of the Solvay process of soda-ash manufacture are easily forgotten, but to the trained intelligence the encyclopedia or the handbook of technical chemistry are not utterly impossible sources of information. Perhaps I exaggerate a little here, not because I disapprove of pointing out in the classroom the simpler practical bearings of the science, but because I wish to make apparent to you the futility of making the secondary school an institute of technology. It is, I think, a fact that the average student who has completed his high school course in chemistry

knows more about the atomic hypothesis than he does about the law of multiple proportions, and less about the laws of Boyle and Gay-Lussac than he does about the manufacture of matches.

Again, gentlemen, has it ever occurred to you that the facts of chemical science would remain the same—that coal would burn, that metals would replace the hydrogen of acids and that chlorin would bleach, even if the atomic theory had never been evolved? Unless the young student is confined pretty closely to one textbook I suspect that he may be in some doubt as to whether the atoms are little black balls or white ones with spots; whether they are fastened to each other by the use of screw hooks and eyes or by the more feminine sort with the "hump." "But," some one may object, "you can best carry to the immature mind the conceptions of atoms and molecules by the use of pictures." Now why, in the name of common sense, must you burden the immature mind with metaphysical theories, when the facts of chemical knowledge are in no way dependent on the human acceptance of metaphysical or other theories?

What then, shall we teach of chemistry, in order not to stray into metaphysics masquerading as chemistry on the one hand, or chemical technology on the other? Every year comes the complaint of the college man that students are in most cases poorly prepared or not prepared at all to pursue the study of the science; and my own limited experience in university teaching leads me to sympathize very strongly with the specialist who frankly tells us that he would prefer his new material entirely unspoiled by previous training. Is it impossible to give a course in general chemistry, covering a period of one school year, that may inculcate in the pupil some of the salient points and fundamental laws of this branch of science, at the same time increasing his intelligence and developing his reasoning power? The training of the prospective college student should differ in no degree from that of the boy who leaves the high school to earn his daily bread, if I understand aright the motive that underlies our system of education. Either, if he continues to study chemical facts, will meet with phenomena

requiring a theoretic explanation, but in both cases the mind will be better prepared to distinguish theory from fact; and in the case of the college student such theories may be quite as ably if not so fantastically presented as at present in some elementary textbooks.

An elementary course in chemistry, such as I have suggested, would preclude a superficial consideration of all or many of the known elements and their compounds, and it would as certainly exclude qualitative analysis. A thorough course in qualitative analysis, aside from its purely educational value, is an absolute necessity in the training of a chemist, but from my own experience, I have not the slightest hesitation in saying that following out a few pages of empirical directions, or worse still, memorizing tabulated statements of an abbreviated nature in a high school course is a waste of valuable time. The working out of a number of more or less unskilfully prepared "unknowns" is about as beneficial to the student as a mechanical puzzle. Chemistry is essentially a science of facts and verifiable laws. The laboratory practice must be of such a nature as to illustrate and bring home to the student not only the typical facts of chemical change, but also the verification of the laws which are derived from those facts. To this end quantitative work in certain carefully selected experiments is necessary. Experiments which do not illustrate definitely some one or more phases of a systematic consideration of the subject may be omitted with advantage. There is in many cases too much playing with chemicals in the laboratory and the performance of more or less startling and entertaining tricks which delight the boys and terrify the girls, and which serve only to distract the pupils' attention from the subject under consideration. Let us have more serious and exact work and less play in the laboratory.

In short, mine is a plea for a thorough, rational course in elementary chemistry that will educate rather than cram, and will benefit the pupil rather than prepare him for a prospective examination. Judging from the present condition of the mar-

ket, a lack of success in chemistry teaching is surely not due to a dearth of textbooks; but even the seemingly needless multiplicity of new texts is sign of a healthy striving on the part of individual teachers for the betterment of their work. None of them is without all merit and some present points of special excellence. After all, though, the human factor stands alone above everything else, and it is to this factor, the chemistry teacher in the secondary school, that I appeal—to educate.

HIGH SCHOOL ATHLETICS: VALUE; CONTROL

Prin. M. J. Fletcher—If the students of our high schools today were reared under the same conditions as were the boys and girls of a century ago, the subject of physical culture in general and of high school athletics in particular, could be omitted from the thought and discussion of schoolmen, and little harm would result. Not so under present conditions. Then only about three boys of every 100 were reared in cities, the other 97 romped and toiled in field and forest, and struggled with the forces of nature at first hand. While thus receiving their physical training under the tutelage of Nature, they were breathing in that peculiar moral tonic which is ever borne on mountain, field and forest winds—that moral tonic which helps to build up solidity of character, to give resolution of purpose and poise of soul.

Probably none of us would care to go back to those "good old times." However, this all must admit: the men who "made and preserved us a nation," who have brought us to our present position of military, commercial and intellectual greatness, have been for the most part men reared under the conditions described. Comparatively few have been, in the strict sense of the term, city bred.

Now at least 33 of every 100 boys in the United States are reared in cities of more than 10,000 population, and this percentage is increasing. In New York more than 60% of our boys are growing up in the cities; and the congested, hothouse conditions of our great cities are not conducive to the development

either of soundness and vigor of body or of energy and strength of character.

This situation forces to the front a problem in education the importance of which is but just beginning to be realized. That problem is to make of boys reared within a city environment, men with that physical vigor and endurance and with those staying qualities of character possessed by their country bred fathers and grandfathers.

I think we shall all agree that any system of education which hopes to accomplish this end must make liberal provision for physical training and development. There is great danger lest we forget the vital relation between a sound mind and character on the one hand and a vigorous, well developed body on the other. The playground, the gymnasium and the athletic field are the chief substitutes education can offer the city boy for the hills and valleys, the broad fields and woodlands at the disposal of his country cousin. The department of physical training, adequately supervised and controlled, must become as much a recognized part of the educational plants of our cities and larger villages as are the departments of science, mathematics and languages. The city boy must not only have a place to play, but, if need be, he must be made to play, and made to play hard —made to play till it becomes work in the real sense of the term. Here it is that the qualities of leadership, courage, fair dealing and self control are best developed—because they are exercised in actual contest and action, not simply talked about as in study hall or classroom. Here it is, too, under proper direction and instruction, that boys will best learn such reverence for their physical being, such respect for the virile qualities of manhood, as to deter them from those habits and vices which are making of so many young men of our land physical and intellectual pigmies.

Under a system of physical culture extending thus through all the grades, athletics are not to be set off as something peculiar to the high school. There are athletics all the way along. Nor do such athletics necessarily have any connection

with those physical contests between different schools, commonly designated as high school athletics. Under such conditions, interschool contests may no doubt be profitably used as incentives; but they should be regarded merely as incidental, not as essential.

Of the value of high school athletics under such a system there can be no question. Nor does their control furnish any occasion for uneasiness; because, being a branch of the regular school work, athletics must be supervised and controlled by school authority the same as any other department.

I grant that I have presented an ideal condition, but it is a condition which some schools are approximating already; and one which should be the goal of every city system of education. More play out of doors, more athletic sports for the entire student body, more systematic physical development will yet be demanded by an enlightened public opinion, even though it necessitates serious inroads on the present school curriculum. But I apprehend that this discussion is to be devoted mainly to present conditions. If the general principles I have laid down are true, then it follows that athletics among the students of a high school are a valuable factor in education, and the greater the number of students who can be induced to engage in them, the better. It is a matter well worth the attention of high school principals—even where no gymnasium or other equipment is provided—to encourage and supervise as far as possible various kinds of outdoor athletics among their students.

But when we come to consider interschool contests in athletics as generally conducted under present conditions, we at once meet some very pronounced objections—objections so serious in many cases as to neutralize any benefits that might otherwise result. I invite your attention to a brief statement of these.

1 Interschool athletics do not represent the physical training of any considerable number of students. Time, interest, attention, are all centered on 20 or 30 boys—often less. Such a system of athletics rests on no broad foundation. It is a

sort of fungus growth, drawing its sustenance largely from school loyalty and the legitimate rights of the mass of students, and often giving the school less than nothing in return.

2 It creates wrong ideals. Boys lose sight of the real object of athletic training and get a very exaggerated notion of the importance of beating the other fellows.

3 It creates and fosters professionalism. Boys learn to play for the spoils rather than for real love of manly sport. When high schools give free tuition or other inducements to students for their services on athletic teams, it presages a condition of things which high school principals ought most seriously to consider. Professionalism in college athletics is deplorable enough; it ought not to be tolerated in the high school.

4 It is unscientific. The contestants are put through no systematic course of training and diet. They are not required to keep regular hours or to refrain from various indulgences. The cigarette fiend is as welcome as anybody. Boys thus entering severe physical contests, besides being unable to do their best, are in much greater danger of sustaining injury than those properly trained.

5 It seriously interferes with the intellectual progress of many members of athletic teams because they are held to no strict standard of scholarship.

6 It is unbusinesslike. Debts carelessly contracted either go unpaid or else have to be assumed by the school. In either case much annoyance is caused and the reputation of the school injured.

7 It is detrimental to the morals of the students. Temptations to deceit and falsehood in making up teams are often too strong to be resisted; and the watchword is likely to be, "anything to win." Moreover the associations and influences which cluster about athletics are often such as to constitute a decidedly demoralizing factor in the school.

These objections would largely disappear if interschool athletics were properly directed and controlled by school authority. In those schools where the evils pointed out do

exist, they must be attributed in large measure rather to the neglect of an evident duty on the part of school authorities than to the fault of students. High school boys are too young, too inexperienced—in a word, too irresponsible—to be allowed full sway in the management of interschool contests. Such contests, under proper direction, are an excellent means of developing judgment, leadership and self-control among students; uncontrolled, they form a most prolific source of the evils I have pointed out. The boys need the steady backing of authority which will see that they receive fair play, but which will never wink at dishonesty or any other unsportsmanlike practices for the sake of winning a victory.

In the control of interschool athletics school authorities should insist on four things:

1 That all members of athletic teams be bona fide students, regularly registered, pursuing a definite number of subjects and maintaining a required standard of scholarship.

2 That such students refrain from the use of tobacco and intoxicating liquors, at least during the season of training, and that they observe certain other regular habits of living.

3 That no games be scheduled without the consent of some person authorized by school authority.

4 That financial matters be kept within the knowledge and control of some person responsible to school authority.

Prin. Schuyler F. Herron—The general topic is so broad that I have selected one branch only of athletics for brief consideration. This is football. Now football is a game arousing the most unbounded enthusiasm and interest. There is a good deal of excusable criticism every time an unfortunate accident occurs, and the rules have hard work to prevent dangerous plays; but on the whole we must recognize its permanence as a game for youth, strength and skill. In college life it must be beneficial; otherwise we can hardly understand how faculties everywhere are found indorsing it, both directly and indirectly.

Let us summarize the usual arguments in its favor as a college game. Members of the team have physical, mental and

moral training. We may not entirely assent to this but for the sake of the argument we will take it for granted. College loyalty is fostered. Boys have a means whereby surplus time and energy are provided for without loafing or dissipation. Students are attracted to the college. In addition to the foregoing, we may be more or less certain that the students have a love for the game and a desire to defeat other teams. This last item, competition, is perhaps more influential than we may wish to admit.

Just as the college has given teachers and methods to the high school, so it has given football. Thus in so far as its origin is concerned, football has a distinct advantage over baseball, and to some slight degree it probably makes the college idea more real to a good many boys than would otherwise be the case. Naturally the boy wishes to obtain for himself the glory that is particularly given to the successful player in the college team, and he wishes to organize the game in his high school. Before considering whether the advantages of college football apply to the high school, let us note that we have here in the boy's wish a very good reason for favoring a team. It is the function of boyhood to play and to play hard. The normal boy must lead a strenuous life in order to be happy. The savage is in him, and so long as a game is not positively dangerous we may well consider whether our duty is not to permit it. MacLaren in *Young barbarians* gives us some realistic tales which show how life appealed to the Scotch boy of the last generation, and at the same time he shows a sympathetic insight into the boys' ideas of today. The fact that a boy may be bruised does not make him love a sport any less and the same fact should not prejudice us against it.

At the same time that we admit the force of the preceding we must also remember that the high school is not the college and that what is good in the latter is not necessarily valuable in the former. A college is not an advanced high school. The high school is organized with the distinct purpose of giving its pupils as much instruction, mental, manual and moral training and

general culture as is possible in their more or less extended attendance. Its pupils go forth to work in ordinary pursuits, not to enter the professions, and the work of the high school must form the basis for the entire future lives of most of its pupils. It is essential that this work should be so arranged and directed as to place the subsequent life on a higher plane than it would otherwise have been. So far as my own observation has gone, I can not say that football, however much enthusiasm it has created, has particularly helped this work.

In the high school the average boy has work to do at home. Now if two sessions a day are held, as is the rule outside of the cities, football practice will take the time after nearly every afternoon session and both the home work and the school work will be neglected. In this connection there appears another difference between the college and the high school. If practice is to amount to anything it must be directed by some competent person. In college there are one or several coaches who have that for their sole business. Any such arrangement is plainly impossible in most high schools and oversight of the team must be left to a teacher, generally in smaller places to the principal. Whether many principals have much spare time to spend in this way, I do not know. It is my impression that most teachers have quite as much as they can do in other lines. Moreover, we may at least wonder whether the same time would not better be given to gymnastic work with all the boys rather than to a team picked for strength and vigor, who already are presumably entirely healthy.

Again, football is an expensive game. The necessary equipment means that considerable money must somehow be raised; and yet this is of less account than the cost of games with rival teams. These expenses can be met but in many instances they require more than an equivalent in time and energy taken from other duties. This is a condition particularly true when there are only one or two men on the school faculty.

Finally, there is a strong tendency in teams to think that games must be won rather than to think that they should be

played for the sake of playing. We are aware of the difficulty that has attended putting college teams on a basis of bona fide students. In very many instances in high schools the local sentiment will justify playing men recently or more remotely in attendance. Of course just as soon as a team ceases entirely to be composed of actual students, it becomes a positive detriment to the school. No advantage can outweigh the loss sustained by leading pupils to think that winning is of more account than honesty.

Having these tendencies in mind, we may conclude that the chief reason for having a football team is the boys' wish to play; and that to avoid much worse results than broken bones, the game must be under faculty control. In saying that broken bones are not the worst possibilities, I believe that I am speaking advisedly; yet here is a point that faculties must regard. One accident will make endless trouble. Up to a recent date the attitude of the colleges was that faculties had no official knowledge of athletic teams. This is still the situation in many high schools and so long as the game is not considered other than ordinary play, this is all right; but when match games are desired, its wisdom may be doubted. If pupils wish to engage in enterprises having a real or apparent connection with the high school, they should be held responsible for such undertakings, whatever they may be, to the school authorities.

The exact manner in which a principal should best proceed with a football team will depend on the conditions in his school. In any case we may conclude that he should provide for this form of athletics only when a sufficient number of boys actually in school wish to form a team, and when some one can be found to direct the practice. Making trips of any considerable length should be discouraged; and the game should be kept on the highest plane of pure sport. Finally, the responsibility for necessary expenditures and for maintaining scholarship rank should be placed on the members of the school athletic association.

If these things can be done it seems to me that a football team may be regarded as worth the expenditure of considerable time and care; but the school authorities should first feel fully assured that the definite purposes for which the high school is supported will not thereby be neglected.

Sup't A. W. Skinner—The question before us this afternoon for discussion is one of increasing importance and one which we, as schoolmasters, whether we believe in athletics or not, must consider carefully. The growth in the last 20 years of the spirit of athleticism, the contests which now take place and which attract great crowds, the importance given the subject by the press and the interest manifested in it by the public have forced us to a realization of the strong position it has gained in the educational system of our country. It must constantly be kept in mind that all forms of legitimate athletics arise from the development and organization of the play instinct of childhood in its freest and most natural expression. The training, directing and stimulating of mind and body through interest based on this play instinct is a marked characteristic of all phases of modern education. We are considering this afternoon the elementary phase of the subject, that of athletics in the high school. Many of the evils attaching to it in college life we escape and therefore do not need to discuss.

The topic before us might well have been enlarged and made to read: "Athletics in the high school, their value, their danger and their control." I wish to consider first their value and to make four points with reference to this: 1) as benefiting our youth physically; 2) as a means of maintaining and enforcing discipline in our schools; 3) as a means of cultivating in our students an *esprit de corps;* 4) and, of most importance, as a factor in the training of our youth.

Let me consider these points briefly. First, as benefiting our young people physically. Most of us here represent high schools in villages or small cities and a great majority of the students in attendance come from families of moderate means where the boy has certain home tasks which, together with the usual time

he devotes to play, give him all the exercise needed. Therefore I do not consider that physical culture or organized athletics in the average school in this state are necessary for the physical betterment of our pupils.

The second point which I desire to make is of more importance. It is possible to use the spirit of athleticism to advantage in enforcing discipline and in developing a spirit of loyalty and pride in the school. The boy who enters a contest wearing the colors of his school can not but feel a loyalty which will be carried, not only into the athletic field but into other and more important relations of school life. The school spirit, which can be developed most certainly through athletics, can be maintained and led to extend into other branches of school activity. However if we are agreed, as I trust we are, that culture is better than learning and a symmetrically developed manhood more to be desired than mere pedantry, the greatest value which I place on organized athletics in our educational institutions is that they may be a most important factor in the training of our youth. The contests for which a boy trains and finally enters teach him most important lessons in self-restraint and patience and arouse in him that feeling of self-reliance without which no one can fight successfully the battle of life. They inculcate in him the spirit of obedience to authority, and this spirit, which is loyalty to the captain of the team, will be extended till it reaches loyalty to the master. The young man, through these contests, learns to appreciate the results which may be won through well directed energy and united effort. They cultivate in him the spirit of unselfishness and steady perseverance. They teach the advantage of right living and healthy habits and may develop all the virtues of manliness, courage and endurance, not because they are "said to be good, but because they are seen to be good" and felt to be absolutely essential to the attainment of the object which he desires.

The danger of all this is that the boy, whose mind is still in a formative period, may come to have an exaggerated idea

of the importance of athletics in his school life. They may become all in all to him rather than an incident in the preparation which he makes for his life's work. When such a point is reached, organized athletics have come to be a positive injury to the individual and to the school; and there is then danger that the organization, which has been perfected and has perhaps accomplished good results in the past, may be destructive to that other authority which it is supposed to support; and it will be all the more dangerous because it is so well organized and because its leaders are apt to be the popular boys of the school and to have as much influence as the teacher over the minds of the students. Another danger, which may easily be obviated by the school authorities, is that there is always an undesirable element which follow all athletic sports, and association or intimate contact with these hangers-on is surely injurious to the minds and morals of our young men. This, however, may be easily checked.

Now to the other part of my talk: how shall athletics be controlled? First, by being recognized as a part of school life over which school authorities have as much control as the direction of studies, the question of attendance and other subjects which have, through custom or law, been under the supervision of teacher or board of education, Second, by requiring that school athletics be such in fact as well as name, and that none but bona fide students who are in regular attendance on school duties be allowed to participate. Nothing is more destructive to the school spirit than to associate town boys and school boys in teams or to allow school teams to play with other than school teams.

There is one other phase which appeals to me and that is the financial side. Wherever athletic associations are formed with managers for the various teams, these managers should be held strictly accountable for the moneys in their hands and be compelled to report to the athletic association regarding the expenditure of these moneys. In this way extravagance may be checked and business habits taught our young people. I believe

the best results may be obtained through the organization of small leagues of schools of the same class and as nearly adjacent as possible. In this way a limit may be placed on the character and number of games played, and through cooperation on the part of the authorities of the schools concerned, a higher standard may be required and a more rigid insistence on those factors which go to make up successful school athletics.

Finally, through a cordial cooperation and sympathy with our boys in this phase of their life, which appeals so strongly to them, we shall come in closer contact with them, we shall know more fully the strength and weakness of their character, we shall lay the foundation of some of those enduring friendships which you and I have enjoyed as students and teachers. As the result of such control and cooperation we shall obtain from our students "zeal without ill feeling, idleness without loafing, liberty without license, pleasure without regret, play with a meaning, sport with a meaning, upbuilding strong character and fine physique as silently and imperceptibly as the web of the spider but as firmly and surely as the growing reef of coral."

Prin. J. Edward Banta—Whether we like it or not athletics have come into our secondary schools to stay. The athletic movement in the schools is contemporaneous with the general athletic movement throughout the country, indeed throughout the continent, and if we attempt to shut it out from the schools we are merely forcing our pupils to engage in athletics where there is no opportunity to exercise a proper control and restraint. We must admit that the coming of athletics into the American school has brought a disturbing influence that is not altogether in their favor; still there remains something to be said in their defense.

Granting all that has been said against athletics, I maintain that they do have value. I believe that thus far we have been looking at the question from the narrower view. Athletics have already, I believe, helped much in the development of the

physique of American youth, and that is to be set down to their credit. Athletics have also done much already to strengthen the basis of American character—for health is an essential element in morality and in national virtue—and that is to be put down to their credit. Athletics have also brought about this result—they have tended to bring us into touch again with mother nature. This tendency throughout the country toward outdoor exercise has its inception in athletics; and these have reached such full development in the colleges that we are rapidly passing from a half developed race to one that is vigorous in mind and body, not afraid to grapple with the great questions that are concerning the country at the present time and the greater ones that will confront the future; and I believe that to athletics we should give all credit for this great movement that is doing so much to encourage outdoor exercise and the strengthening of the physical life.

Now our schools primarily have to do with things of the mind and it is very easy to trace the relation of athletics to the things of the mind. The mind is in a body and for the mind to do its best work the body must be in a healthy condition. It can not long remain in a healthy condition without proper exercise, and exercise to be effective needs to have in it an element of joy. One method of securing this joyous exercise is through competition. Competition has as its firm foundation the development of a vigorous man. But the step from the means as development to the end in itself is one very easily and altogether too readily taken. It is just at this point that the question of the control of athletics comes in. The question that confronts the schools today is the proper regulation, the holding of athletics in its proper place as a means of physical training and not as an end in itself. I maintain that athletics can be so controlled that we can secure all the advantages and minimize the accompanying evils; and thus we shall have what is beneficial and not what is injurious.

In the first place athletics, from the side of athletics, need to be under control. The schools have followed the colleges and

will follow them so long as the schools are the feeders for the colleges. Older brothers come home and tell of college pranks and they are imitated in the schools; they come home and tell of college successes and beget in the younger brothers and sisters a school spirit. Wherever you find a movement in the colleges you will find it reflected in the schools. But while the colleges have passed from the stage of experimentation with regard to athletics, the schools are still in that phase. At first athletics started out absolutely without control, being wholly in the hands of the student body. It was only five years ago that we began to hear such terms as graduate coaches, faculty members of the athletic association, advisory board of the faculty in regard to college athletics; and yet today no college leaves the control of athletics in the hands of the students. The students form the athletic association which takes action, but it is the advisory committee which sanctions such action. It is the small boy driving the horse; the reins are in his hands but the father's hands are out beyond.

With the faculty management a series of eligibility rules in the main adopted by the student body has come in. At Yale university there is a set of rules known as "eligibility rules", adopted by the athletic association, which in a measure determine who shall and who shall not play on the teams. To show the spirit of honor that has come into college athletics, a man whom I can name, a resident of this city, was in Syracuse university nearly a year, then in a preparatory school in Pennsylvania; then he entered Yale. Among the resolutions drawn up by the student body is one that if a man comes from another university he shall not be eligible to play for one year after his entrance. That question came up in connection with the most desirable man on the team, and now, having stood by the resolution that they themselves had drawn up, Yale attributes in part its defeat by Harvard to the fact that this man did not play.

If a man in his development passes through savagery to civilization. I believe that the high school student during his four years is entering on or passing through the semicivilized into the

civilized state; but his reason and his judgment are still subordinate to his feeling of intense loyalty to his school, and it is necessary that there should come in just at that point control by the school authorities. In the high schools of this state several associations have been organized. The school with which I happen to be connected is associated with several others in interscholastic games, and a series of resolutions has been drawn up by the students themselves to the effect that a person, to represent a team or play on a team, must be a member of the school from which he comes; must have been enrolled three weeks (thus shutting out all professionalism); must be present at 75% of the recitations; must take not less than 10 hours work. I believe that they will go further and say that he must take not less than 15 hours work and be present at 90% of the recitations; and under these conditions the men who are playing on the teams will be getting something besides popularity, they will be getting a good mental training also. But so far nothing is said in regard to his standing. It is incumbent on school authorities to fix a standard for him to reach, and I believe it should be the same as for other students, not one bit lower, not one iota of favor granted to him; he should make his subject reach the general standard of 75% required by the school; then he should know at least once in four weeks just where he stands and if on any four weeks work he falls below the standard he should be debarred from the team till his standing is brought up again. Thus the proper control will be brought in and one of the evils attendant on athletics remedied.

If it be true that culture is more to be desired than mere learning, if it be true that a sound mind does its best work in a sound body, if it be true that the supreme object of education is the development of the whole man, the formation of character, then under proper control athletics can be made an element of great benefit to the schools, the good far outweighing the evil that may result.

Prin. A. H. Wilcox—It has certainly been interesting to me to listen to the previous discussion, and I think I may say very

fairly that I have never listened to this particular question discussed in such a fair manner. In fact when I showed the program of the present conference to a gentleman who is vitally interested in all school work he expressed pleasure that the officials of the association deemed the subject of enough importance to place it on the program; and I certainly think it does mark a step in advance when a body of serious men and women devote at least an hour to the discussion of a subject which some years ago would have been considered as not worthy of the attention of any serious educator.

You may have heard the story of the proud father who took his son to church. The boy was about 10 years old and as the service progressed and the minister got well into his sermon, the father noticed that the boy was apparently all rapt attention, immovable, his eyes fixed on the clergyman. But all of a sudden he nudged his father and leaning toward him whispered, "Papa, is Dexter the fastest horse in the world?" That question is a fair indication of the value of athletics in the mind of the average boy. They instantly command his attention and the athlete immediately commands his respect.

As to the attitude of those in authority something else might be said. The attitude of a good many, it seems to me, has been very much that of people on a sidewalk when a runaway horse is coming down the street. Most of us are apt to stand on the sidewalk and say "Whoa! whoa!" and the more we say "Whoa!" the faster he goes. Finally he may hit a lamp post on a corner and come to grief. Once in a while there is a man with enough presence of mind and the courage to run out and master the animal.

In this day and age of the world, athletics in school affairs have come to mean almost exclusively football, and I confess my own mind immediately turned to that branch when the subject was presented to me. It seems to me we are apt to think too much of those who are engaged in athletics and not enough of those who are not. The school is supposed within reasonable bounds to have control of the mental welfare of the chil-

dren, and to a certain extent of their moral welfare; but I think that the physical welfare of the children and a possible improvement in their physical condition has not fully recommended itself either to parents or to boards of education or to educators in general.

The old saying was, "Be good and you will be happy," but of late years they have been transforming that into the saying, "Be happy and you will be good," and why not? Does it not do you good to look at the broad shoulders of our president and to think that physically he is the peer of any man he may meet? How many a bright mind in school has come to grief for lack of a proper house, a house which might have been made a proper receptacle for the mind!

It is well to set our ideals high though we may never reach them, and in the matter of athletics our ideals should include some training for every boy and girl in the school. In the majority of schools today such facilities are not offered. In certain schools our conditions have come on us unawares. Some years ago no one would consider the subject of athletics because it took care of itself. The boys specially, in nearly every case were attending schools in communities where outside of school hours they were abundantly occupied in outdoor sports of a healthful kind or in labor provided by their parents, and the full development of the body came as a matter of course. But as our towns have grown into cities and our cities have grown larger we have come to have a school population whose tendency is to come to school in the morning and stay till the end of the session and for the rest of the day and evening receive no proper physical training.

Now as to the value of it, it seems to me there can be no question. Probably no one in this audience needs to consider that. Probably you have discussed it with yourselves, and each one of you has decided that a proper amount of athletic training is valuable. But as to the control of athletics. I think Prin. Banta has most admirably outlined the situation. Of course the control must vary according to conditions and

traditions. Where a very direct control by the school authorities would be successful in some instances, in others it might be well to have it more veiled, more indirect; but surely there should never be a school where athletics are uncontrolled, where they are not officially recognized by the authorities of the school. A faculty representation in the board of athletics, if there is such a thing, is the most direct way of coming in touch with some of the best minds of the school. Where gymnasium training can be afforded it is the very best thing; and boards of control and boards of education that can do so are in duty bound, as they would provide for the intellectual training of the children in the classroom, to provide also for their physical welfare since their bodies and minds may not be separated as long as they are on the surface of the earth. Their value to the community depends directly on their physical welfare.

The tendency is to concentrate the athletic training on a few on the football team or on the baseball team or the track team, some nine or 11 or 15 persons who get all the benefit. If every boy in the school could get some training it would minimize to a certain extent the extraordinary and unnecessary attention which is paid to a certain few in the school, and at the same time it would enable more branches of athletics to be carried on by more individuals than is now possible.

To sum it all up: athletic training for all as far as conditions permit; athletic training under proper control; with the idea that all who are here today and those who may be here in the next generation need proper houses for their minds—"a sound mind in a sound body."

——— ——— It is the custom in a great many schools for one of the teachers to coach the football team. It is also the custom for that teacher to play on the team and it is a glorious sight. I have seen such men play; they can take the ball and rush down the whole length of the field and nothing there can stop them. But it is not half so fine if the teacher happens to be on the other fellows' team and your boys can

not stop him. I wish this point had been brought out. Where there is any competition between schools the teacher who who coaches should be kept off the team.

Prin. F. S. Fosdick—I wish to present three thoughts. First in reference to control. There would be no athletics in Masten Park high school if the control should ever slip out of the hands of its principal. That is all I have to say on control.

Second, I was unfortunate in not hearing all of the first speaker's paper. I heard a fragment of a sentence and that was in reference to fairness in the competing teams, specially when school is pitted against school; how the temptation comes up to "run in ringers" or get unfair outside help. But this temptation comes not only in football but in other games, in other contests. I would rather be responsible for fairness in five football games than in one interscholastic debate.

I appreciate all that has been said in favor of athletics. I understand the feelings of all who have spoken against them, and I say to you that it would relieve me of a great deal of responsibility, a great deal of thought and solicitude if athletics could be banished from Masten Park high school. But there is this phase of the subject that has not been touched on and that is what might be called the adhesive power of athletics. The boys come to us from all sorts of environment, from all sorts of homes, in what might be termed the formative state of mind. And you know from your own experience that there comes into a boy's life that critical time when it is merely the turn of a hand between right and wrong, between going on with his education or going back to an environment which is oftener debasing. I believe in athletics thoroughly because it enables us to hold our boys. I have in mind now a young man who came to us six years ago. He came from home surroundings that were anything but uplifting and for nearly a year it was a question in my mind whether it was better to simply turn him down and out or to hold on to him. There was but one way that I could influence him and that was through the game

that has been criticized here today, football. He was interested in that and for four years it held him in the school. His father wanted to take him out, he himself would become discouraged and wish to leave, but through that one agency we kept him year after year. The day before Christmas there came into my office a ruddy-cheeked, healthy, manly looking fellow from one of the largest of our colleges who shook my hand and said, " Mr Fosdick, I want to thank you. I can not thank you enough for the fact that you kept me in school all those years." My friends, all the trouble, all the care, all the responsibility that came from this branch of athletics was as nothing when I realized that through its cohesive power I had saved even one boy for a better, a truer, a higher life.

Prin. C. D. Larkins—It seems to me one element has been omitted entirely in the discussion this afternoon, and that is the girls. I have not heard anything about athletics for girls, and it is not at all clear to me why it is not just as well for girls to engage in athletics as for boys. I think I would not recommend the formation of a girls football team under present rules, but I can conceive that if the rules were slightly modified it might be a fairly good thing to have a girls football team. It is my fortune to be associated with a school that has the distinction of belonging to what I believe is the only girls high school athletic league in the world. In that school there has been for four years past an active interest among the girls in athletics. They are not only interested in the boys athletics but they have games of their own, and we find precisely the same effect on the girls from engaging in athletics as on the boys. You all know what effect football has on boys. We find practically the same effect on girls in their basket ball games. We not only have no trouble in finding a sufficient number of girls to engage in basketball games, but we have a good deal of trouble in cutting the number down to the point where three teachers can take care of them. They enjoy it as much as the boys do. They have the same interest in it that the

boys do. Another thing the girls can do is to play tennis, and I see no reason why they should not be encouraged to play tennis while the boys are engaged in other lines of sport. And it is just as much fun to see five good healthy girls tackle a basketball game as it is to see 11 active boys tackle a football game.

——— ——— I know how very difficult it is to adopt foreign games and induce our young people to take an interest in them but here is an idea that I have long wanted exploited. I have had no chance to try it myself but I hope some of you are in such circumstances that you can, and will believe enough in it so that you will try it. I have just been going over *Tom Brown's school days* again and I read to my son of 16 the account of one of the Rugby games in which there were 125 men (meaning of course boys) on one side. How many there were on the other side the story does not say; but if you will get down that book and read that description again I believe you will find some suggestions there that will stir the blood of American boys. You need not say anything about Rugby football; call it high school football if you will.

I know of one place in New York where the whole school was organized for a somewhat similar game. They had a restricted ground but they divided the school (about 100 boys) into two parts, choosing up as in the old-fashioned spelling matches, and each side adopted a color. Then they went out and practised for weeks, the whole crowd. One of the rules was that the ball could not be carried forward; there was no hugging the ball. Second, they did away with the element of tackling which is often so severe on the weaker pupils. The ball must be advanced by kicking, something after the Rugby fashion. There were other rules adopted which can easily be invented by those who have to fit the rules to the circumstances. The result was that the whole school was actively engaged and thoroughly interested in this universal play which took in all the boys. Now I believe by studying the English games, dropping off the English names and adapting them to our cir-

cumstances we shall have games adapted to our conditions and which will give training to all the boys. I wish to offer just that one suggestion; perhaps some of you can work it out during the coming year.

Prin. Francis J. Cheney—As the principal of a school in which athletics have been given place I wish to say that when football was first introduced I allowed it with some misgivings. But I watched it specially with reference to its effect on the individual player, for I believe that our most effective work in the schoolroom is done with the individual student rather than with the students as a mass. I have satisfied myself that at least three very desirable characteristics of a man are greatly helped in their development in the boy who plays football. The first is courage. I have watched from the side lines the young man playing his part as full-back, half-back, center or wherever placed, and I have observed that when the critical time came if he lacked courage he was lost and the game was in danger; but the boy who had the courage to take the place and do the work assigned him at the critical moment was the boy who helped win the game; and in him this desirable characteristic was being developed. I could name boys in my own school who have been greatly benefited in this way by their experience in football.

Another desirable characteristic that football tends to develop is loyalty. Loyalty in this world is a great thing if one is only loyal to the right thing; and we principals know that if our boys are loyal to our schools they are loyal to the right thing. Loyalty to an ideal is a splendid quality in a young man. Loyalty to an institution that makes for the upbuilding of character is desirable. To develop the spirit of loyalty in the young men of the country for the institutions of the country, specially its public schools, is to do something toward the development of citizenship.

The third desirable characteristic that I find developed in our young men is that of reliability. I maintain that it is worth while to train a young man so that when you put him in a place

of responsibility you know that when you want him you can find him, because in the face of the storm and stress of life, he is true to his convictions of duty and, therefore, true to himself and his God. The value of reliability in character can not be too thoroughly inculcated, and having seen it developed on the football field I have become an advocate of this kind of athletics.

The men who have served on the football teams of the country, whether in the college or in the school, have often been the men who have gone out into the world and done the strenuous work of life. It is somewhat refreshing to know that we have a man at the head of this great country who, not taking time to discuss propositions of an annoying crank, simply knocks him down and passes on to more important work.

Friday evening, 27 December

UNION MEETING FOR HIGH SCHOOL AND GRAMMAR SCHOOL PRINCIPALS

HOW CAN THERE BE BROUGHT ABOUT A MORE EFFECTIVE ARTICULATION OF THE WORK AND INFLUENCE OF THE HIGH SCHOOL AND THE GRAMMAR SCHOOL?

Prin. George W. Kennedy—Personally I am very sorry that Prin. Marvin is not here to open the discussion and give us material on which to work; but I will attempt to present a few particulars in which I think the work of the high school and the grammar school might be better correlated. I shall not attempt to go into psychology or an abstract discussion of the question but simply present some plans that we may consider in a businesslike way. In the first place I think that a general reason in many cases for not having a closer correlation between grammar and high school, is the fact that high and grammar school teachers do not understand each other; one teacher does not know what another is doing so that teachers in the lower grades might be helpful to those in the higher. I think it would be very wise for teachers and principals of grammar grades to meet high school instructors and talk over methods of discipline and management of written work, composition and other studies carried up from the grammar into the high school.

In Troy last year we had a Schoolmasters club composed of teachers of the Troy schools which met once a month and discussed the work of both high and grammar schools, and I am sure that we obtained better ideas of what was going on, we of the lower schools of what was passing in the high school, and high school teachers of what was being done in the grammar schools. Certainly we learned during the year to correlate our work to better advantage. Among other matters we discussed the recitation plans we were each following, and the extent to which the topical method and the question and answer method were used in the grammar schools.

Another thing of general importance is the report that each grammar school principal should make to the high school principal. This report should show the standing of the pupils who are to enter the high school, their physical defects, their mental aspirations, their scholarship rank, their ideals, in general about what the high school instructors may expect of the pupils who are coming to them. In this way the high school teachers feel that they are acquainted with these pupils and can classify and arrange them to better advantage than could otherwise be done. Such reports were made last June to the high school principal in Troy, and he told me the other day that they were of great assistance to him and his fellow workers in determining the arrangement and instruction of the first year classes.

As to the high school side of this question, correlation is needed in arranging our courses of study so that they shall be of greater benefit to pupils. We have gone on too long requiring all our high school students to do the same work and pass through precisely the same process. I have been pleased to hear in this room and in the room occupied by the grammar school council the suggestion that we must get out of the lockstep; that we must provide education which is practicable and for the greatest benefit of each student. This does not seem to me so very difficult. It is quite an easy matter for any principal so to arrange his program that pupils coming to him physically weak shall not be overburdened with work, and that those who can do much more than others shall not be held back. Pupils who have no aptitude for mathematics and can not do difficult work in physics, for instance, should be given easier tasks so that they shall enjoy their studies and make, on the whole, better progress and still not be shriveled physically before the four years are passed. Adolescence should be very carefully studied in the earlier years of the high school. The mental and moral development of our pupils must be considered and the high school course should be so arranged as to meet the needs of the individual. We discover by a study of the pupils in the high school, that the processes of mind so develop that

later in the course pupils may well go back to certain studies that they found difficult earlier. Accordingly, we shall do well to arrange curriculums so that those who do not seem to have any aptitude when they first enter for algebra, for instance, may be given just enough algebra to do the elementary work in geometry, or just enough geometry to give needed practice in deductive reasoning. Later in the course these pupils will, in many cases, be able to pursue to excellent advantage topics formerly slighted.

Another defect in high school instruction which interferes with correlation is a matter of method. Occasionally we discover that high school teachers treat the incoming class as though they were seniors. Teachers work in about the same way with the first year as with the fourth year pupils. In many cases I believe this is a mistake. I think it would be wise for many pupils on first entering the high school to be treated as though they were still really children, and the work more largely illustrated with objects or treated in a conversational way. The geometry teacher who takes up the subject for the first time would do well sometimes when speaking of revolving a figure, to make the figure of paper and revolve it actually, not in imagination.

On the side of the grammar school some defects forbidding proper correlation are quite prominent. One is, in many cases pupils in grammar grades are not taught to study by themselves and for themselves the textbooks, and so fail to gain power to get at the meaning of the printed page. We have heard considerable about that at this meeting. And it is a fact that we pick to pieces everything that the pupil has to do. All the phrases have to be explained to the class and all instructions gone over again and again. We think we must chew up things and reduce them to pabulum before the pupils can master them. A little solid mental mastication on the part of the pupils in preparing material for themselves will be excellent for them when they go to the high school and are given certain difficult lessons. Surely the pupil who has most of his work

done for him by his grammar school teacher is not prepared to attack a system of mathematics consisting very largely of symbols unheard of before.

Another thing is that in our grammar schools we do not exercise the memory of our pupils sufficiently; principles and facts are not thoroughly taught. Pupils are referred to notebooks and to textbooks for important principles when they ought to have these principles and formulas in their heads. For this reason they are weak when they come to the mastery of difficult declensions, and still more difficult conjugations, of foreign languages.

Again it would be very helpful in bringing the work of the high school in closer connection with that of the grammar school if the pupils were given some training in scientific investigation. Undoubtedly, we have been desiring too much and bringing too many studies into the curriculum, but a little instruction in observing facts and formulating conclusions drawn from them, a little practice in reasoning would be a very valuable adjunct to science work in the high school, and could easily be taken up in connection with other duties without necessitating a period by itself.

I have noticed also, in observing the recitations of our grammar school pupils, that they go over certain statements without understanding the language they are using; that is, they get more or less accustomed, with certain teachers, to learning what are supposed to be facts, and yet are not facts to them because they do not grasp all the words. It is very important in almost any subject, that the pupils have a clear understanding of the language used. It does no good to give facts about the zones unless the pupil knows what a zone is. He must understand the meaning of the term before he can discuss it.

Take another illustration. I once heard a pupil say in a recitation in New York geography that certain counties of New York were noted for great quarries of sandstone, limestone and granite. I soon found that he did not understand the terms at all and I thought, "What is the use of teaching this sen-

tence unless the pupil understands what the terms mean, and can tell one of these rocks from another when he sees them?" All the language that the pupil uses in his study, he must comprehend; otherwise he acquires a careless slipshod method that totally unfits him for that accurate, careful application so necessary in the pursuit of any science, or the mastery of any foreign language.

In passing, I wish to mention one exception to the above rule. In committing to memory selections from the masterpieces of literature the choice language, the beautiful figures and the ennobling sentiment of standard writers may be far beyond the grasp of the child's mind; but in later life these gems of the masters will recur, clothed with beauty, pregnant with meaning and full of inspiration.

My final indictment against the grammar school is the practice of "puttering" and "over-neatness," a fault confined chiefly to the so called best schools. In some of these schools every exercise must be so precise and accurate in mechanical detail that it sometimes becomes painful. Good form is indeed important and must be insisted on but should not be carried to an unwarranted extreme. It is an actual fact that pupils under this kind of training become so absorbed in the business of beautiful execution that it interferes in a marked degree with mental processes and absorbs time needed for study and drill. As Sup't Maxwell of Greater New York says, in substance, in a late report: this habit of extreme neatness undoubtedly diverts attention from more important matters. Specially in composition and language exercises is it injurious. It injures the imagination and curtails freedom of thought.

In this cursory reference to lack of proper articulation between the work of grammar and high school, I call your attention, then, to the following:

1 Lack of sympathy and cooperation between teachers of higher and lower grades.

2 Lack of data in the hands of high school instructors for classification of pupils on entrance.

3 Too rigid curriculums; no special provision for mentally slow or physically weak pupils.

4 Little study of mental development and aptitude of pupils.

5 Want of illustrative and concrete instruction in lower high school grades.

6 In many grammar schools pupils are not taught to study textbooks independently; they are deficient in knowledge of facts and principles; a thorough comprehension of the language used is not required; and puttering and neatness are sometimes carried to an extreme.

F. R. Parker—For the gap which is felt to exist between the work of the grammar school and the high school, for the seemingly inadequate preparation of the average pupil for entering on high school work, for the lack of interest and consequent dropping out of many pupils during the first year or two, there seem to be two reasons: first, the difficulty the pupil has in adjusting himself to the department plan of teaching, where he is under the charge of three or four specialists; second, the somewhat uninteresting and narrow curriculum of the graded school.

As to the first: the pupil in the graded school has been under a single teacher for all his classes for a year at a time. This method affords opportunity for teacher and pupil to get into harmonious relations. The teacher is able to place a just estimate on the pupil's ability and progress. On the other hand, when the pupil enters the high school he goes for one period a day to each of three or four teachers who in many cases know or care little about his previous preparation; and who, from their being specialists, are apt to regard the subject as of more importance than the pupil. In consequence the latter is apt to feel all at sea; he misses the more intimate relations of the grammar school and thinks he is not understood or appreciated.

More cordial relations should exist between grammar and high school. Let the teachers of the latter who have to deal with the entering pupils, visit the grammar school occasion-

ally and see what is actually being done there. This would result in a better understanding of what the entering pupil knows, without which it is impossible to lead him on to new acquirements. Less frequently would he be criticized for not knowing what he has never been called on to learn and what it is the province of the high school teacher (under the existing curriculum) to teach him.

There are, of course, some pupils who get as far as the high school but have no capacity for that work, and never will, no matter what encouragement and sympathy are given. Whether this is chargeable to nature or previous training depends on the individual case.

Second, as to the curriculum of the grammar school: in its barest form it proposes to teach the fundamental school arts of reading, writing and ciphering—arts which are means to an end, namely, the attainment of useful knowledge. For some years efforts have been made to enrich and broaden this course by putting into it subjects which have an interest in themselves, a connection with actual life, and which at the same time serve to prepare pupils for higher work. But, while ambitious and progressive superintendents have done much in this direction, the majority, owing to the slowness with which public sentiment can be moved or to a disinclination to make experiments, have allowed things to remain much as they were.

Under the old routine the pupil becomes bored by the monotony of arithmetic, geography and spelling; by a course that appeals so much to the memory, so little to the other faculties; that calls into play so few of his expanding interests. Consequently, long before he is ready to enter the high school he longs to get a taste of real life and to free himself from the bondage of the textbook. Four years ago this subject was discussed by this association and from the resolutions passed it appears that there was a fairly strong sentiment in favor of enriching and broadening the course. Some have deemed it a sufficient remedy to add a subject or two (as elementary history, algebra or a foreign language) at the end of the course.

But even if this were done, there would still be a gap—only at a different stage in the pupil's progress. Reforming the course should begin lower down.

First with reference to arithmetic. The opinion seems to be general that the work should be simplified and less time given to it. Much has been included which is not practical. The report of the mathematical section of the committee of 10 (of 1892) speaks in no uncertain way with reference to this when it recommends that "those subjects should be entirely omitted which perplex and exhaust the pupil without affording any valuable mental discipline . . . Among the subjects to be omitted are cube root, compound proportion . . . and the greater part of commercial arithmetic. Percentage should be rigidly reduced to the needs of actual life." It also recommends, not the systematic study of algebra in the grades, but that the pupil, while studying arithmetic, should be familiarized with algebraic symbols and expressions including methods of solving simple equations.

That committee had also something to say about the early preparation of the child for the study of geometry, a preparation which was to begin "in the primary school by his becoming familiar, through the senses, with simple geometrical figures and gradually learning some of their properties and relations, this to be done in the regular course in drawing. At about the age of 10 systematic instruction in concrete or experimental geometry should begin, occupying about one hour per week for at least three years. The main facts of geometry should be taught, not as an exercise in logical deduction but in as concrete and objective a form as possible." These two recommendations seem to be conservative enough and worthy of trial.

One of the most hopeful signs of progress in enriching the graded course is the attention now given to nature study. Reports of superintendents and principals show that there are few schools of any pretensions which have not made some provision for this. Scarcely is there a meeting of teachers without a discussion of the value or methods of nature study. If one were

to offer any criticism, it would be that much of the work done is unsystematic and superficial, is in fact mere play; but this can and will be remedied. Teachers have not as yet had opportunities for thorough preparation for the work. Nature study aims at widening the child's acquaintance with the world around him and cultivating his powers of observation, and therefore ought to offset, to no slight extent, the deadening routine of much of the old course.

This association four years ago, after an extended discussion, voted in favor of the introduction of Latin or some other foreign language into the eighth or ninth grades. Evidently this has not been carried out to any great extent. While believing strongly in the study of foreign languages—ancient or modern—I fear it will be a long time before this recommendation will be acted on generally. It will probably be regarded, even by those in sympathy with the innovation on other grounds, as an unjustifiable loading up of the course.

To allow the great majority of our children, who go no further than the grammar school, to finish their school education without a knowledge of the history of their own country, is surely unjust, unpardonable. Many schools do teach history in the eighth grade, some in the seventh. Some begin earlier still in paving the way for historical study by the study of mythology and biography, chiefly in connection with the supplementary reading course. An acquaintance with the lives of the men who have made history gives reality to the subsequent study of that history in detail. The reading of such books as Guerber's *Story of the Greeks* and Clarke's *Story of Troy* can hardly fail to awaken a desire for the study of ancient history.

The most important subject of all remains to be dealt with—the English language. Probably in no other subject is there so great a difference in amount and quality of instruction in different schools. In some schools abundant practice is given in oral or written reproduction of stories from the very beginning, and the pupils are led through an extensive and well selected course of supplementary reading. We believe that

pupils with such training will not find any great difficulty in adjusting themselves to secondary school studies. Ignorance of the mother tongue comes very near being the root of all school evils. We have all found students in history to whom the pages of the textbook furnished many a puzzle because of ignorance of the meaning of common words and students in American literature (so called) who were incapable of interpreting a not too difficult poem of Bryant or Lowell. It is time the study of literature should cease to mean the reading of short sketches of the lives of writers, great and little, and should denote the intensive study of selections from the best writers.

There is at least one state system of education which requires in each school the careful study of specified selections, prose and poetry; and this study is continuous through the grades to the last year of the high school course. For three periods or more a week the pupil's attention is given to the interpretation of poetry or the study of prose style and drill in the meaning and use of words. In the hands of capable teachers this can but result in a respectable knowledge of the language and in the cultivation of something like a real taste for literature.

Proposals to broaden and enrich the course at once bring complaints in regard to the time required. Any such change, it is said, will cause a hopeless congestion of studies and will burden further the already too hardworked teacher. But it is admitted that we can save time in arithmetic, and can we not lessen the time given to geography? Scores of facts are memorized only to be forgotten, or if retained are of no value. Many maintain that less time should be given to formal grammar, this study belonging late in the high school course. Not a few would be willing to throw physiology overboard altogether, and there is much to be said in their favor.

Apart from the teachers' objections comes the complaint from the public that where the course is enriched it is at the expense of spelling. Correct spelling is a good thing. We should demand it of our high school pupils and should regard it as a

legitimate subject of instruction throughout the whole high school course. But is it wise or practical to spend so much time on spelling in the case of the great majority of our pupils in the grades, who leave school to take up some manual occupation, and to whom a knowledge of history or literature, however slight, is vastly more important?

We conclude, then, that reforming the course along such lines would bring two desirable results: first, the work of the high school would be a logical development of that done in the grades; second, the graded course would be a better preparation for life in the case of those whose education goes no further—which is, after all, the more important consideration.

Prin. B. M. Watson—There is a somewhat prevalent feeling that if the grammar school was all it ought to be its graduates would do better work in the high school. A feeling also obtains in some quarters that if there was not something wrong with the high school the boys and girls would do better work after they leave the grammar school. Having had considerable experience as a teacher both in the high and the grammar school, I am in a position to sympathize with both views. I apprehend that this question has little pertinence to the smaller towns where the high and grammar schools are under the same roof and management; that the complaint comes chiefly from cities having one or more high schools entirely separated from the grammar schools; that the difficulty, where it arises at all, is due rather to the general arrangement of the school system and the diverse methods of instruction in vogue in the different grades; and that the remedy, if it is to be found at all, must be looked for along these lines.

Children in the primary and grammar schools are watched over and cared for with tender interest by both parent and teacher. The parent says that the child must complete the elementary school course whether he has any capacity for scholarship or not. The teacher has set for herself a standard which involves the passing of every pupil in her class. Whenever a pupil fails of promotion the teacher loses caste with herself

and the parent feels that the reputation of the family has been jeopardized. The pupil knows that if he has any weak places the teacher is sure to find them and coach him up to the passing point. The classes are rushed through the different grades under these conditions and at the end they receive the regents preliminary certificate which entitles them to admission to the high school. The children emerge from this quasi-paternal—or in most cases maternal—sort of environment and are dumped into the high school with 300 or 400 others of the same age and grade, boys and girls of 14, at the most critical and formative period of their lives. They hand in their names, and those names imply nothing of individuality or personality. Each child represents merely one unit among the hundreds. After a while he is assigned to a squad of 40 for algebra, to another squad for Latin and so on through the different subjects. Then lessons are assigned, so many pages in algebra, the first lesson in the Latin book, a list of directions for English. The pupil is thrown from dry land into mid-ocean and before he can begin to swim he finds himself sinking. I think this condition can not be explained by saying that it is due to the beginning of three or four new subjects at the same time. The burden of argument is altogether on the other side. The very newness and freshness of these subjects ought to act as a tonic and give new zest to study.

If I am right in my idea as to the cause of the gap between the grammar and the high school, then at least one remedy is obvious. Instead of one great unwieldy high school in a city of 100,000 or more, there should be about one high school to every 10,000 inhabitants. That would mean, in a city like Syracuse where each grammar school is fed by four or five primary schools, the addition of a full academic course to each grammar school. There are many advantages in such a plan. The child entering the high school would meet with no change of environment. He would know the teachers and the teachers would know him. There would be a mutual personal interest between teacher and pupil which is now wanting. There would

be a lack of the distracting influences always present where many boys and girls are congregated in the same building. Instead of 1500 high school students in a city like this we should have 2500. Instead of 150 or 200 graduates each year there would be 500. Of course there are objections to this plan. It would be more expensive; but it need not be very much more expensive. Some things in buildings and equipment might be sacrificed for the benefit from the greater efficiency of the schools. One good teacher without any equipment is worth more than 20 indifferent teachers with all the equipment that is known to publishing houses or modern supply agents. A very successful business man in this city says if it pays to put any money into an enterprise it pays to put in enough to do some good. If that applies to a business proposition it certainly applies to the educational problem.

If it is out of the question to have a full academic course in every grammar school, then let us have two years of the high school course. Half a loaf is better than none. If this is impossible, much may yet be accomplished by a modification of methods of instruction on both sides. For the grammar school teacher whose range of vision goes beyond her own grade and school there is abundant opportunity to do much in the way of inspiration which will prepare the child for the change to the high school. A bit of elementary science may be given now and then, for instance, with the suggestion that more may be learned in the high school. A liking for literature can be inculcated among grammar school pupils. Even a taste for dead languages is quite possible to pupils of the higher grammar grades; and I think that toward that end the word analysis which we had till recently was a very valuable subject. I may be pardoned for saying that I have always deplored its elimination from the regents preliminary requirements. Mr Wheelock says that word analysis was dropped because the college and the high school men said that as it was studied it did no good and the examinations showed horrible results. I am bound to accept that explanation; but I am also bound to

believe that if that was the case it was because the grammar school teachers either did not understand how to teach it or did not know enough—their range of knowledge perhaps was not broad enough. Just in this connection I may say that it is quite possible that some of the high school teachers know too much; that they live too near the atmosphere of the college lecture room; that if they would reach down to meet the pupil as he comes from the grammar school, deal less with abstractions and do more inductive work the results might be better.

To recapitulate, I would say first, let us have more high schools. Many parents today in choosing a college to which to send their sons and daughters prefer the small to the large one for reasons quite familiar to all of you; and those reasons have tenfold greater force in favor of a moderate sized as against a very large high school. The coming man will be a college graduate. This may not come just now but it will in time. I am afraid the coming woman also will be a college graduate. In 50 years the high schools will have as many graduates as the grammar schools now have, the colleges will have as many graduates as the high schools now have, and the element of illiteracy in our country will be confined to the recently imported foreign element. So we ought to prepare for that. If we can not have a full high school course in the grammar school, let us have a two year course; and if we can not have that, then let the grammar school teacher look up and let the high school teacher look down.

Sup't C. B. Gilbert—In an educational system there is no place for distinction of caste, and in the education of a child there is no place for artificial shocks. Both these are found altogether too abundantly in our system and they are responsible to a large degree for this trouble between the grammar school and the high school which is our subject tonight. It is the complaint all along the line. The primary teacher says that the kindergarten has spoiled the children for primary work; the grammar school teacher says that the primary teacher has *failed* to fit the children for work in the higher grades. All

along the line nobody has done good work excep the work at the time; and if we went still h complaint would be met.

Now it is true that good work is done in all d is true that the grammar school teachers teac the high school teachers teach well; but they do one another; they have artificial standards. Ea child coming in by the standard he has set up i and that constitutes a large share of the troub school teachers knew what is done in the gr knew the conditions that prevail there and e what they ought to expect we would hear much

Sup't Whitney of Elgin Ill. reported in the the *School and home journal* an interesting ex complaint was coming to his ears continually, as of every superintendent, and he arranged for teachers to visit the grammar schools. The t a class in elementary algebra coming in went in schools where the children were studying ma grammar school teachers knew a day or two l they were to be visited and presented just, fai The high school teachers went back and said, no more complaints." The English teacher vinced that if she had held the children as caref been as closely taught as they were in the g there would have been no trouble, and for the Whitney says, the difficulty ceased in his schoo

It is the lack of common appreciation that part of the difficulty, and another is this cas I dare not say much about that. The honorabl ing children is divided among teachers from ki and I know of no part than is more honorable and if the high school teacher considers that high school teacher he is on a higher plane an teacher below, he is making a very serious m here does it, of course, but people have been kı the history of education and it sometimes cau

There is no place in the educational system for artificial shocks. Education is a continuous vital process. Now an artificial shock, a shock put in by a teacher, is an injury to the child. The gradation from the highest grade of the grammar school to the lowest grade of the high school should be as natural and easy as from the second to the third primary grade. It is simply a forward step and the child should not be made to feel unnecessarily that he is going into a new atmosphere; he will feel it to a degree anyway. It is a new environment and the conditions are enough in all conscience to worry the child and frighten him out of existence. I remember a high school teacher who used to say to her pupils, "Here you are, here is the work; now sink or swim," and a lot of them sank and it was her fault. There is no time in the course of education when a teacher has a right to say to a child, "You must swim or drop out." Who knows what is in a child? Here is a boy who is progressing rapidly. The first steps of his education have been wonderfully successful and we say: "He is going to be a great man; we will help him along." Here is another boy who goes on slowly year after year and we say: "We will drop him out." Who knows but that the slow boy will be the great man? I remember such a boy. He was a discouragement to all his teachers and we all thought we better let him go. He began to take an interest about the second high school year and he is now—not yet a great man, but likely to become one in his chosen field. He is a professor of astronomy in one of the great western universities. He simply traveled slowly at first, but he accumulated speed. There is no place at which we can say to these boys, "We will shove you off." The high school is not a great sifting ground.

Let us remember, too, that when boys and girls go into the high school they are at the most important and critical period of life. You have heard about adolescence recently. When the boy and the girl go into the high school they are at this time of storm and stress. You know that between the ages of 14 and 18 more than three fourths of all the criminals are made,

and between 14 and 18 more than three fourths of all the converts in church. It is the time when life is in an upheaval and if ever in their lives young people need help they need it then. In the grammar school their teachers have carefully guided them and helped them; but they go into the high school and what do they find? Too frequently the cold critical eyes of teachers who think more of their subjects than of the boys and girls, and they are left to wander from class to class, friendless, chilled and discouraged, longing in vain for the sympathetic touch of the grammar school teacher. They belong to no one and when at length disheartened they drop out of school, to the teacher it means merely an erasure in his class book; but to the child it is a tragedy. Then of all times they need somebody to stay right by them and tell them what they want most. That is the time when it is criminal to put them into the cold bath as the savages do, and let those who can swim and the others drown. We have drowned a good many of our best boys and girls by this system which has been so all-prevalent in our high schools. I am not a sentimentalist but I know boys and I know girls pretty well, and I know that many boys and girls enter high school at about 14 years just longing for somebody to talk to them and advise them, and for somebody to hold on to. Why is it that during the first year of the high school almost all over the country from 25% to 50% of the pupils drop out? Largely because they are lost. The child is discouraged and the teachers measure him—"He is not good in my subject," "He failed in my subject," and the boy or girl as an individual is not thought of. I say that is almost criminal.

Now for the grammar school teachers. Sometimes there is too much coddling in the grammar school. I believe in helping, but on the other hand children can not stand it to have everything done for them. Our boys and girls do not learn to study enough in the grammar school. They should have time in school to sit down and work out problems as hard as they can master, and do it alone. But when they go into the high school they should be given to somebody who will look after them—

a sympathetic teacher friend. That is not sentimentalism; it is good hard sense if you want to save your boys and your girls.

I would to a degree cut down departmental work in the high school. Teachers tend too much to become specialists. It is a narrowing and benumbing process to teach elementary algebra hour after hour and day after day and nothing else. I would put the boys and girls during their first year in the high school in charge of teachers who would watch them, help them, sympathize with them, teaching them meanwhile in at least two subjects if possible and superintending their study; and so let them grow gradually into this life. I have seen that tried in a high school with the result that losses for the first year were cut down 50%.

This is a subject that interests me so much that I am unable to cover it in the time allowed, but if you bring your high school teachers and your grammar school teachers together, get a common standard and lead them to understand that they are engaged in the honorable and noble work of training children, to understand that their work is not teaching things but training children, and see that every boy and girl that goes into the high school has a teacher friend instead of a teacher of things, I think it would save some of the boys and girls and do away with some of the difficulties.

Saturday morning, 28 December

Pres. Warfield—I wish to thank you all for the loyal support you have given me in carrying out the plans for making this meeting a success. You conferred on me a year ago a very high honor. I have tried to show my appreciation of it and again thank you for it.

Prin. Winne, I take great pleasure in presenting to you this gavel as a symbol of the authority of my successor for the ensuing year. Gentlemen, I present to you Prin. Winne, president of the Associated academic principals for the year 1902.

Pres. Winne—Prin. Warfield, I recognize this as the emblem of initials and conclusions: of initials when it calls for attention; of conclusions when judgment is rendered. If I shall be

as tactful in conducting the meetings of this body as you have been and as wise in using this emblem of authority, I shall be most happy. I congratulate you that you have conducted the work so that the duties of president have appeared void of anxiety and teeming with pleasure.

Fellow principals, I appreciate the honor that you have conferred on me. As far as it is within my power I shall perform the duties of the office faithfully, hoping for your cooperation.

During the last year, I have been very deeply impressed with the progress our work has made the past few years. When I saw the report by Com'r Harris and noted the growth of secondary work throughout the United States, I was glad to be numbered with the men who had contributed to the development of secondary schools—specially in the state of New York. When, in other states, we have heard New York referred to as the Empire state in education, we have felt a just pride. Today we recognize that great credit is due this association of academic principals for the high esteem in which secondary schools are held.

The pleasant and continuing impression made on me by Little Lord Fauntleroy was: I have many friends—my mother has very many friends. In like manner, this association has many friends—education has very many friends. We must not forget that it was the general awakening among schools of all grades that found this association one medium of expression and won for it a host of friends. Thus has the association been a mediator between that which was and that which is. We have affiliated with the interests of the secondary schools the interests of the elementary schools and the colleges. We must continue to select and conserve and promote the best in education.

The officers of this association desire from you on every question suggestions that can in any way aid in advancing the interests of education in the state of New York. By serving well those with whom we are associated we shall gain for ourselves the highest honor.

ATTENDANTS AT

17th Annual Conference of the Associated Academic Principals

Under names of institutions those not specially designated are teachers and instructors.

UNIVERSITY OF THE STATE OF NEW YORK

Regents

[1]Charles R. Skinner M.A. LL.D.

University staff

Administrative department. 1 James Russell Parsons jr M.A. (Trinity) *secretary.*

College and high school departments. 2 Henry L. Taylor M.A. Ph.D. (Syracuse) *director's assistant.*

Inspection division. 3 Charles F. Wheelock B.S. (Cornell) *head inspector;* 4 Charles N. Cobb M.A. (Syracuse); 5 Charles Davidson M.A. Ph.D. (Yale); 6 Eugene W. Lyttle M.A. Ph.D. (Hamilton); 7 S. Dwight Arms M.A. (Hamilton); 8 Ezra J. Peck M.A. (Williams) LL.D. (Hobart); 9 Edward S. Frisbee M.A. D.D. (Amherst); 10 James H. Gibson, *apparatus inspector;* 11 Frederic M. Baker, *apparatus clerk.*

DEPARTMENT OF PUBLIC INSTRUCTION

12 Charles R. Skinner M.A. LL.D., *superintendent;* 13 A. M. Wright M.A., *second deputy sup't;* 14 Henry R. Sanford M.A. PhD., 15 Sherman Williams Pd.D., 16 P. M. Hull M.A., 17 Charles A. Shaver, 18 Irving B. Smith M.A., *institute conductors;* 19 Sarah A. Collier, *special institute instructor;* 20 Frank H. Wood, *supervisor of training classes;* 21 John C. Bliss B.A., *inspector of training classes;* 22 C. Edward Jones, *examiner;* 23 W. J. Barr, 24 A. Edson Hall, 25 John J. N. Symes, *inspectors, compulsory attendance.*

INSTITUTIONS IN THE UNIVERSITY

Colleges for men

Colgate university, Hamilton. 26 Pres. George E. Merrill; 27 Vincent Barrett Fisk.

Columbia university, New York. 28 M. C. Whitoker.

Niagara university. 29 Rev. P. J. Conroy C.M.

St John's college, Brooklyn. 30 Rev. E. L. Carey, *prefect of studies.*

Colleges for men and women

Alfred university. 31 Pres. Boothe C. Davis.

Cornell university, Ithaca. 32 Prof. Charles De Garmo; 33 Prof. L. M. Dennis; 34 Martha Van Rensselaer.

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[1]*See* Department of public instruction.

Keuka college, Keuka College. 35 Pres. George H. Ball; 36 Prof. R. M. Barrus.

University of Rochester. 37 Pres. Rush Rhees.

Schools of education

Teachers college, Columbia university, New York. 38 Prof. David Eugene Smith.

Other special schools

N. Y. state school of clay working and ceramics, Alfred university. 39 Charles F. Binns, *director*.

Academies, high schools and academic departments

Adams high school. 40 Prin. R. H. Snyder.

Addison high school. 41 Prin. F. H. Miller.

Akron high school. 42 Prin. A. T. Rinker.

Albany high school. 43 Com'r Harlan P. French.

Albion high school. 44 Sup't and Prin. Willis G. Carmer.

Alden union school. 45 Prin. W. G. Welker.

Alfred academy. 46 Prin. Earl P. Saunders.

Almond high school. 47 Prin. W. Floyd Harris.

Amityville high school. 48 Prin. Charles Warren Hawkins.

Amsterdam high school. 49 Prin. W. H. Lynch; 50 Oren R. Smith, *ass't prin.*

Andover high school. 51 Prin. A. C. Gillette (Illinois Wesleyan and Geneseo normal school) Ph.B.

Antwerp high school. 52 Prin. Edwin C. Hocmer.

Apalachin union school. 53 Prin. Frank E. Fenno.

Attica high school. 54 Prin. Arthur M. Preston.

Ausable Forks union school. 55 Prin. Vivian Sadler.

Avoca high school. 56 Prin. W. B. Patrick.

Babylon high school. 57 Prin. William H. Lisk.

Bainbridge high school. 58 Prin. F. W. Crumb.

Baldwinsville free academy. 59 Prin. Horace D. Rickard.

Ballston Spa high school. 60 A. A. Lavery, *supervising prin.*

Barlow school of industrial arts, Binghamton. 61 Prin. V. S. Paessler M.A.

Batavia high school. 62 Sup't and Prin. John Kennedy.

Bath-on-the-Hudson high school. 63 Prin. W. H. Good.

Bayshore high school. 64 Prin. Charles W. Mulford.

Bergen high school. 65 Prin. Edwin A. Ladd.

Binghamton high school. 66 Sup't D. L. Bardwell; 67 Prin. J. Edward Banta; 68 Vice-Prin. E. R. Whitney.

Black River union school. 69 Prin. A. E. House.

Brasher and Stockholm high school, Brasher Falls. 70 Prin. Horatio P. Baum.

Bridgewater high school. 71 Prin. J. B. Swinney.

Brier Hill union school. 72 Prin. Rupert Nisbeth.

Broadalbin union school. 73 Prin. E. A. Lewis.

Brownville union school. 74 Prin. W. J. Linnell.

Brushton high school. 75 Prin. E. L. Hulett.

Buffalo central high school. 76 Henry H. Denham.

Burdett union school. 77 Prin. John Probes.

Caledonia high school. 78 Prin. Fayette W. Van Zile.

Cambridge high school. 79 Prin. Ernest E. Smith.

Camden high school. 80 Prin. E. S. Babcock.

Camillus union school. 81 Prin. C. S. Boatfield.

Canajoharie high school. 82 Prin. Schuyler F. Herron.

Canandaigua academy. 83 Sup't and Prin. J. C. Norris; 84 Char F. Blair.

Canastota high school. 85 Prin. George H. Ottaway.

Candor high school. 86 Prin. Edgar L. Andrews.

Canisteo high school. 87 Prin. F. K. Congdon.

Canton high school. 88 Prin. Charles L. Mosher.

Cape Vincent high school. 89 Prin. C. A. Fetterly.

Carthage high school. 90 Prin. M. F. Perry.

Castleton union school. 91 Prin. Willard H. Waterbury.

Catskill free academy. 92 Sup't T. A. Caswell.

Cattaraugus high school. 93 Prin. George A. Bolles.

Cazenovia seminary. 94 Francis D. Blakeslee, *president.*

Charlotte high school. 95 Prin. Herbert G. Reed.

Chatham high school. 96 Prin. Charles S. Williams B.A.

Christian Brothers academy, Albany. 97 Bro. Maurice.

Churchville high school. 98 Prin. Nicholas Lee.

Clayton high school. 99 Prin. Ernest Robinson.

Clifton Springs high school. 100 Prin. Henry G. Wolcott; 101 N Lobdell, *ass't prin.*

Clyde high school. 102 Prin. H. N. Tolman.

Coeymans high school. 103 Prin. R. A. Mable.

Colgate academy, Hamilton. 104 Prin. Frank L. Shepardson.

Collins Center union school. 105 Prin. Harold J. Russell.

Constableville union school. 106 Prin. H. G. Grubel.

Cook academy, Montour Falls. 107 Prin. F. L. Lamson.

Corning free academy. 108 Sup't and Prin. Leigh R. Hunt.

Cornwall high school. 109 Prin. Hermon C. Woodworth.

Cortland union school. 110 Sup't and Prin. F. E. Smith.

Coxsackie high school. 111 Prin. George William Fairgrieve.

Crown Point union school. 112 Prin. Eugene M. Sanders.

Dannemora union school. 113 Prin. G. H. Bruce.

Depew union school. 114 Prin. H. C. Hustleby.

Deposit high school. 115 Prin. W. L. Harris.

De Ruyter high school. 116 Prin. Emmett C. Miller.

Dexter high school. 117 Prin. Burt Alverson.

Dobbs Ferry high school. 118 Prin. G. A. Morrison.

Dundee high school. 119 Prin. D. B. Smith.

East Aurora high school. 120 Prin. C. L. McGavern.

East Bloomfield high school. 121 Prin. Frederick Bird Jones.

East Islip union school. 122 Prin. Howard M. Tracy.

East Rockaway union school. 123 Prin. C. D. Vosburgh.

East Syracuse high school. 124 Prin. Samuel Reed Brown.

Egberts high school, Cohoes. 125 Prin. W. C. Tifft.

Elba union school. 126 Prin. Alexander M. McIlroy.

Ellenville high school. 127 Prin. John W. Chandler.

Ellington high school. 128 Prin. Ernest B. Luce.

Elmira free academy. 129 Prin. Howard Conant.

Fabius high school. 130 Prin. Walter Scott Austin.

Fairport high school. 131 Prin. Thomas C. Wilber.

Falconer union school. 132 Prin. J. S. Wright.

Fayetteville high school. 133 Prin. D. B. Williams.

Flushing high school. 134 Prin. John Holley Clark.

Fonda high school. 135 Prin. E. B. Robbins.

Forestville free academy. 136 Prin. A. C. Anderson.

Fort Edward high school. 137 Prin. W. S. Coleman.

Frankfort high school. 138 I

Franklin academy and Prat Prin. James M. Glass M.A.

Fraser union school, Hastings

Freeport high school. 141 Pri

Freeville union school. 142 I

Friendship high school. 143 I

Fulton high school. 144 Prin.

Fultonville high school. 146]

Genesee Wesleyan seminary, I

Glens Falls academy. 148 Pri

Gloversville high school. 149 Millard Davison.

Goshen high school. 151 Prin

Gouverneur high school. 15

Gowanda high school. 153 P

Great Neck high school. 15

Greenport high school. 155 P

Groton high school. 156 Prin

Hammond union school. 157

Hammondsport high school.

Hancock high school. 159 P

Hannibal union school. 160 I

Haverling high school, Bath.

Hempstead high school. 162

Herkimer high school. 163 S

Hillsdale union school. 164 I

Hilton high school. 165 Prin

Holley high school. 166 Prin

Homer academy and union s

Honeoye union school. 168 P

Honeoye Falls high school.

Hoosick Falls high school. 1

Hornellsville high school. 17

Hudson high school. 172 Sup

Huntington high school. 17

Ilion high school. 174 Sup't

Irondequoit union school. 175 Prin. John Greene.

Irvington high school. 176 Prin. R. A. MacDonald.

Islip high school. 177 Prin. Matthew I. Hunt.

Ithaca high school. 178 Sup't and Prin. F. D. Boynton; 1
E. E. Bogart.

Jamestown high school. 180 Prin. Milton J. Fletcher.

Jamesville high school. 181 Prin. George T. Fuggle.

Jordan free academy. 182 Prin. R. B. Searle.

Kinderhook union school. 183 Prin. Scott Youmans.

Kingston free academy. 184 Prin. M. J. Michael; 185 J.

Lafargeville union school. 186 Prin. J. E. Vincent.

Lake George union school, Caldwell. 187 Prin. George C

Lake Placid high school. 188 Prin. W. Almon Andrews.

Lancaster high school. 189 Prin. Burt Byron Farnsworth

Lansingburg high school. 190 Prin. James Ray Craighea

La Salle academy, New York. 191 Bro. Edward.

La Salle institute, Troy. 192 Bro. Maurice, *ass't prin.*

Lawrence high school. 193 F. De Lancey King, *supervisi*

Leavenworth institute and Wolcott high school, Wolcot
Lewis H. Carris.

Le Roy high school. 195 Prin. J. C. Benedict.

Lestershire union school. 196 Prin. E. T. Graves.

Liberty high school. 197 Prin. George J. Dann.

Little Falls high school. 198 Prin. Charles H. Warfield.

Little Valley high school. 199 Prin. A. C. Miller.

Lockport high school. 200 Prin. Oliver J. Morelock.

Lowville academy. 201 Prin. W. H. Perry.

Ludlowville union school. 202 Prin. Wilbur F. Saxton.

Luzerne high school. 203 Prin. Christopher Keller.

Lyons high school. 204 Prin. W. H. Kinney.

Lyons Falls union school. 205 Prin. S. J. Neff.

Manchester union school. 206 Prin. Charles H. Herrick.

Manual training high school, Brooklyn. 207 Prin. Charle

Marcellus high school. 208 Prin. William S. Covert.

Margaretville high school. 209 Prin. Reuben L. Country

Marion collegiate institute. 210 Prin. H. E. Bradley.

Marlboro union school. 211 Prin. Arthur Ramsdell.

Middleville union school. 219 Prin. Ira M. Gast.

Millbrook memorial school. 220 Prin. William R. An

Millerton high school. 221 Prin. James S. Luckey.

Moravia high school. 222 Prin. John D. Bigelow.

Morris high school. 223 Prin. Calvin Derrick.

Morrisville high school. 224 Prin. Clayton G. Mabey.

Mt Kisco high school. 225 Prin. Phil H. Hembdt.

Mt Vernon high school. 226 Prin. A. B. Davis.

Mumford union school. 227 Prin. Eugene M. Lath.

Munnsville union school. 228 Prin. F. M. Wiggins.

Munro collegiate institute, Elbridge. 229 Prin. L. G. T

Mynderse academy, Seneca Falls. 230 Sup't C. Willard

Naples high school. 231 Prin. L. W. Herrick.

Nelsonville union school. 232 Prin J. B. England.

New Berlin high school. 233 Prin. Arthur R. Mason.

New Hartford high school. 234 Prin. A. M. Scripture.

New Rochelle high school. 235 Sup't I. E. Young; 236 Babcock.

New York Mills union school no. 2. 237 Prin. W. S. 1

Newark high school. 238 Prin. Charles A. Hamilton.

Newark Valley high school. 239 Prin. Julius S. Kingsle

Niagara Falls high school. 240 Prin. W. B. Chrisw

Norwich high school. 249 Prin. B. C. Van Ingen.

Nunda high school. 250 Prin. E. E. McDowell.

Oakfield high school. 251 Prin. A. H. Downey.

Oakwood seminary, Union Springs. 252 Francis N. Maxfield, *headmaster.*

Olean high school. 253 Prin. Olin Wilson Wood.

Oneida high school. 254 Sup't A. W. Skinner.

Oneonta high school. 255 Prin. Robert S. Roulston M.S.

Onondaga free academy, Onondaga Valley. 256 Prin. Guy A. Bailey.

Ontario high school. 257 Prin. A. P. Burroughs.

Oriskany Falls union school. 258 Prin. F. Reid Spaulding.

Ossining high school. 259 Prin. Ida W. Bennett.

Oswego high school. 260 Prin. Charles W. Richards; 261 John N. Vedder.

Oswego Falls union school. 262 Prin. Charles D. Hill.

Ovid high school. 263 Prin. Benjamin E. Birge.

Owego free academy. 264 Sup't H. B. Tilbury; 265 Prin. H. L. Russell.

Oxford academy and union school. 266 Prin. Robert K. Toaz.

Palmer institute-Starkey seminary, Lakemont. 267 C. C. Wilcox.

Palmyra classical high school. 268 Prin. W. J. Deans.

Painted Post union school. 269 Prin. B. E. Hicks.

Patterson union school. 270 Prin. U. F. Axtell.

Penn Yan academy. 271 Sup't J. M. Thompson; 272 Prin. E. W. Cutler.

Perry high school. 273 Prin. H. C. Jeffers.

Phelps union and classical school. 274 Prin. Willis Arnold Ingalls.

Pittsford high school. 275 Prin. Daniel Pratt.

Poland union school. 276 Prin. C. L. Bailey.

Pompey union school. 277 Prin. H. O. Hutchinson.

Ponckhockie union school, Kingston. 278 Prin. W. A. McConnell.

Port Byron high school. 279 Prin. W. X. Crider.

Port Jervis high school. 280 Prin. Edward P. Smith.

Port Washington union school. 281 Prin. Palmer J. Jones.

Poughkeepsie high school. 282 Prin. C. H. Woolsey.

Pulaski academy and union school. 283 Prin Charles Melville Bean.

Ravena union school. 284 Prin. B. I. Morey.

Remsen high school. 285 Prin. Charles R. Clark.

Rensselaer high school. 286 Prin. Louis F. Robins.

Rhinebeck high school. 287 Prin. Burtis E. Whittaker.

Richburg union school. 288 Prin. James M. Reed.

Richfield Springs high school. 289 Prin. E. B. Callahan.

Ripley high school. 290 Prin. Hiram J. Baldwin.

Rochester high school. 291 Sup't Charles B. Gilbert; 292 Prin. Albert H. Wilcox; 293 William M. Bennett; 294 C. E. Harris.

Rushford high school. 295 Prin. Frederick Leighton.

Rushville union school. 296 Prin. Charles J. Smith.

Sacket union school, Sacket Harbor. 297 Prin. B. G. Pooler.

St Gabriel's school, New York. 298 Bro. Michael, *prin.*

St John's catholic academy, Syracuse. 299 Bro. Adolphus F.S.C.

St Johnsville high school. 300 Prin. C. G. Campbell.

St Mary's academy, Ogdensburg. 301 Rev. J. H. Conroy, *prin.*

Salamanca high school. 302 Prin. Thomas Stone Bell.

Sandy Creek high school. 303 Prin. George E. Brownell.

Saratoga Springs high school. 304 Sup't Thomas R. Kneil; 305 Prin Walter S. Knowlson.

Saugerties high school. 306 Prin. Fred N. Moulton.

Savannah high school. 307 Prin. E. G. Merritt.

Savona union school. 308 Prin. Walter C. King.

Schaghticoke union school. 309 Prin. Malcolm G. Thomas.

Schoharie high school. 310 Prin. William F. H. Breeze.

Schuyler's Lake union school. 311 Prin. Avalo H. Pratt; 312 L. Doran, *ass't prin.*

Sharon Springs union school. 313 Prin. Howard J. Jump.

Sherman high school. 314 Prin. Seward S. Travis.

Shortsville high school. 315 Prin. J. F. Bullock.

Sidney high school. 316 Prin. A. S. Knight.

Silver Creek high school. 317 Prin. Edwin J. Howe.

Sloan union school. 318 Prin. Lawrence P. Button.

Sodus union school. 319 Prin. Elisha Curtiss.

South New Berlin union school. 320 Prin. Jay D. Lester.

South Side high school, Rockville Center. 321 Prin. J. Anthony Bassett.

Southampton high school. 322 Prin. J. G. Peck.

Southold union school. 323 Prin. William M. Wood.

Spencerport union school. 324 Prin. Fred W. Hill.

Spring Valley high school. 325 Prin. John M. Gibbs.

Stillwater union school. 326 Prin. Willis U. Hinman.

Stony Point high school. 327 Prin. George D. Sykes.

Syracuse high school. 328 Prin. W. K. Wickes.

Ticonderoga high school. 329 Prin. Fred V. Lester.

Tonawanda high school. 330 Sup't F. J. Diamond; 331 Prin. F. J. Withington.

Troy academy. 332 Prin. Frank Coe Barnes.

Troy high school. 333 Prin. M. H. Walrath.

Trumansburg union and high school. 334 Prin. Frank M. Westfall.

Tully high school. 335 Prin. H. I. Van Hoesen.

Ulster free academy, Rondout. 336 Prin. John E. Shull.

Unadilla high school. 337 Prin. A. E. Barnes.

Union Springs high school. 338 Prin. Jesse C. Bell.

Utica free academy. 339 Sup't George Griffith; 340 Prin. A. L. Goodrich.

Valatie high school. 341 Prin. W. L. Millias.

Van Etten union school. 342 Prin. Norman C. Gile.

Vernon high school. 343 Prin. J. Earl Carmichael.

Walden high school. 344 Prin. Lincoln R. Long.

Walton high school. 345 Prin. James R. Fairgrieve.

Walworth academy. 346 Prin. Carrol A. Mider.

Warrensburg high school. 347 Prin. Ezra W. Benedict.

Washington academy, Salem. 348 Prin. Arthur B. Vossler.

Washington Irving high school, Tarrytown. 349 Prin. A. W. Emerson.

Waterford high school. 350 Prin. H. J. Gibson.

Waterloo high school. 351 Huse T. Skerritt, *supervising prin.*

Watertown high school. 352 Prin. Gary M. Jones.

Watervliet high school. 353 Prin. James A. Ayers.

Watkins high school. 354 Prin. S. S. Johnson.

Waverly high school. 355 Prin. Harry J. Walter.

Waverly union school of Tuckahoe. 356 Prin. Arthur C. Haff.

Wayland high school. 357 Prin. J. Wells Reed.

Webster high school, 358 Prin. Eugene E. Collister (Illinois Wesleyan) Ph.B.

Wellsville high school. 359 Prin. Samuel J. Slawson.

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